Tips, guides and reports for people repairing televisions and electronic equipment

TELEVISION

AND HOME ELECTRONICS REPAIR

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Practical field servicing

Dehumidifier problems and repairs

Memoirs of a cable technician



Test Report

The Icom IC-PCR1000

Satellite, Audio, Monitor, TV, VCR and DVD faults

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Next issue, dated September, on sale August 20

Have we lost the way?



We live in a world that has become less fair and responsible, that in fact doesn't seem to regard these qualities as all that important.

The first half of the last century was not one of the world's better periods. It included the blood bath of World War I, the economic devastation of the depression years that saw the rise of dictatorships and militarism, and the horrors of World War II. In 1945, at the end of World War II, people looked forward to a better world. In many respects they were not to be disappointed. There followed a long period of relative peace and growing prosperity across the globe. But, almost sixty years later, things are not going so well. This is not the place to consider the widespread corruption that prevents economic development in many parts of the world, and the growth of religious extremism with its destabilising effects. But factors that affect the economy and trade are our concern. The study of history should provide policy makers with warnings and at least some guidance for successful decision making. It is unfortunate that history tends to be a neglected subject.

The idealism of the immediate post-war years certainly seems to be a thing of the past. We live in a world that has become less fair and responsible, that in fact doesn't seem to regard these qualities as all that important. The adoption of aggressive free-market economic policies over the last three decades has led to a growing earnings disparity, with those who can grabbing what they can while, at the other extreme of the employment range, wage cutting has in many parts of the world become a way of life. This includes the mighty US economy. I can recall when business leaders, some of them anyway, said they wanted their employees to be well paid. It was considered a matter of self-interest. How else, the argument went, would employees be able to buy all the goods businesses produce, and hence generate profits and prosperity? We know the answer to that one: by borrowing.

Consumer borrowing enables the economy to grow fast, but is not without its dangers. There is plenty of evidence that borrowing in the UK has become excessive, with people taking on more debt than they can comfortably handle. There are obviously limits. You can have a sort of debt bubble, akin to an investment or an asset-value bubble. The effect when the bubble bursts is danger to the economy, with deflation a possible consequence.

More likely however is that people will simply cease to take on extra debt, a sort of borrowers' strike, knowing that their limits have been reached. The effect is the same but not so drastic: trade declines. For the time being the financial authorities are encouraging people to continue taking on debt by keeping interest rates low – or lowering them. This has become the way in which the economy is controlled. It has its own dangers, and is a long distance in time from the days when the chancellor of the exchequer would try to control the economy by raising and lowering purchase tax.

In some parts of the world interest rates are now so low that there is little further scope for action. The only remaining options would seem to be to push long-term interest rates down to the same level as short-term ones or create money, the traditional "resort to the presses". Such policies may not work, may take an unconscionable time to have any effect, or may eventually create further mayhem. The truth is that economic management is an uncertain business. Huge economies such as Europe, Japan and the US move in unpredictable ways. This is also true of smaller economies such as the UK. You can be lucky for a time, maybe for several decades, then things suddenly become intractable. Ask the Japanese or German authorities.

One thing that helps is the advent of new products that people need or want. Solid-state electronics and information technology must have provided a huge impetus to worldwide economic progress, though it's very difficult to assess such effects. We haven't reached the end of the road with new marketing opportunities. There's plenty in the pipeline, but at the macroeconomic level their results will, on this occasion, probably be rather muted.

Would a return to more responsible social/economic behaviour help? Possibly, in the long term. The short-term approach encouraged by aggressive free-market operations can bring product to the market quickly and cheaply, but may not generate the long-term profitability required for business building and growth. Businesses borrow as well of course – in fact that's largely how they work – but the get-rich-quick approach does not produce stable long-term economic growth, whether in the West or SE Asia, now the production centre of the world.

It would certainly do no harm to return to such concepts as a fair day's wage for a fair day's work, and see an end to the fat-cattery and its doleful consequences. Risk-taking would still be required, because it's an essential part of business. But this doesn't mean that smart-arses should be encouraged to take charge. All too often they've done just that, with lamentable results.

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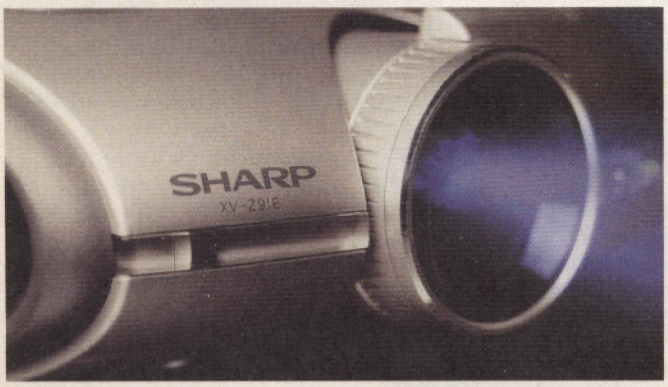
TELETOPICS

OLED display technology

Sony is to start mass production of Super Top Emission active-matrix, full-colour OLED (organic light-emitting diode) display panels next spring. OLEDs provide a self-luminous display without the need for backlighting. Sony is making a capital investment of Y9bn (some £466m) in the project. The company started development work on OLED displays in the early Nineties. In February 2001 it demonstrated a 13in. display that was only 1·4mm thick, and in January 2003 a 24in. display that consisted of four integrated 12in. panels. Production capacity will start at 300,000 2in. panels for mobile products such as digital still cameras and phones.

A consortium of European firms and organisations, including CRL Opto and the University of Hull, has been set up to develop 3D organic LED displays. The light-emitting polymers used will be photopatterned, resulting in a simpler manufacturing process than with a conventional active-matrix display. Patternable OLED differs from normal OLED in emitting plane-polarised light, which will make it easier to create a 3D display. The OLEDs will be combined with LCD technology. Applications are expected to include medicine, computer-aided design and video games.

Eastman Kodak and Sanyo have jointly developed a 14·7in. OLED display for use in TV sets. Toshiba and Matsushita have developed a 17in. WXGA ink-jet printed OLED display.



Sharp's DLP projector Model XV-Z91E.

Euro HDTV

In a trial that took place on 7 July the Belgian high-definition TV facilities company Alfacam, EVS Broadcast Equipment and SES Astra worked with Norwegian broadcaster Viasat-TV3 in the production and transmission of live HDTV football to electronic cinemas in Denmark and Norway. It was the first official trial for Euro1080, a European HDTV channel that's due to go on air next January. The new channel will broadcast exclusively in an HD format, offering high-quality programmes covering music, sports, shows, cultural events and documentaries. It will provide two services, a main one for European households and an Event service with special feeds.

Nineteen HDTV cameras were used for the trial broadcast. The HD feed was uplinked via the Astra 3A satellite and received by a number of electronic cinemas in Copenhagen and Bergen. HDTV projectors were used for the display, with 12m screens.

Video news

JVC has launched a combined hard-disk drive (80GB) and S-VHS recorder, Model HM-HDS4 (see photo). Its features include DV in/out and VideoPlus+ De Luxe. The company has also launched a new DVD recorder, Model DR-M1, that caters for the three official recordable DVD formats (DVD-RAM, DVD-RW and DVD-R) and includes progressive-scan technology. More details of JVC's progressive-scan products and strategy will be given in a report next month.

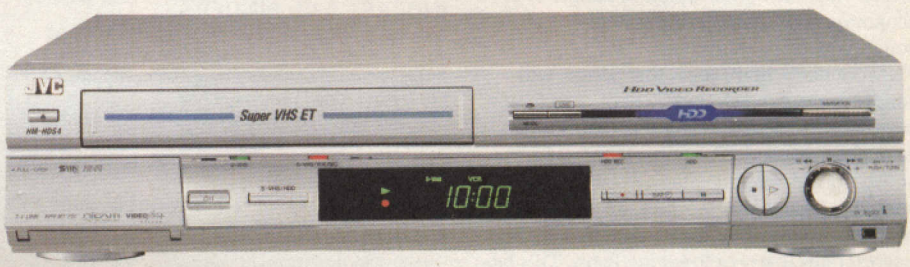
Sony has launched two DVD players with progressive-scan outputs, Models DVP-NS930 and DVP-NS999ES. A number of Sony TV products provide progressive-scan displays, including LCD Model KLV-30MR1, plasma Models KE-32TS2, KE-42TS2 and KE-42MR1, and the VPL-VW12HT home-cinema projector.

Zarlink Semiconductor has launched two PVR (hard-disk recorder) processor chips, types ZL10320/321, that the company says should enable manufacturers to produce PVRs to sell at under £300. The company feels that the market will take off when the cost of PVRs falls to about £200.

Sharp is extending its home-cinema range with the addition of the entry-level projector Model XV-Z91E (see photo). It uses Texas Instruments' DLP (digital light processor) technology and has a short-throw lens that enables the user to adjust the picture without compromising image quality even in a small room. Set-up is very simple, using the unit's tilting base and a lens-shift function that adjusts the vertical projection position. Once installed it's easy to use, with on-screen menu controls that include contrast, brightness and colour temperature. Features include 2D digital keystone correction, six picture presets, gamma correction to enable the contrast and detail to be increased in dark scenes, and white enhancement. The fan has a low noise level of 29dB. There are video (including two component), S video and RGB PC connections, enabling the projector to be easily integrated with an existing system to show action from various sources. Displays can be in 16:9 or 4:3 format. Price is about £2,400.

LG has recently introduced a 44in. set that uses DLP technology.

Thomson has launched a 61in. rear-projection model, the Scenium III, which includes 100Hz scanning, an integrated DVD player that's compatible with MP3 files and CD-R discs, Virtual Dolby Surround, picture-in-picture, three scart sockets and a multi-brand, multi-product remote-control unit.



The JVC hard-disk/S-VHS recorder Model HM-HDS4.

Samsung aims at LCD leadership

Samsung Electronics is to invest some $17bn over the next ten years in five new LCD panel production lines at Asan, 80km south of Seoul. This is in addition to its previously announced sixth production line (see May leader), a $1bn investment, elsewhere in South Korea. Work on the new factory was scheduled to start in July, with mass production expected by 2005. Samsung then expects to have a global market share of 24 per cent.

Four months ago LG Philips announced plans to invest $10bn in a new LCD plant in South Korea. At present Samsung and LG Philips each have a 17 per cent share of the global LCD panel market. They are followed by AU Optronics (Taiwan) and Sharp with 12 and nine per cent respectively. Sales of LCD monitors and TV sets have been slow to take off, because of their higher cost, but are expected to start to rise significantly in the next couple of years. One analyst forecasts an increase in global LCD screen sales from $25bn this year to $43bn in 2006. The average price of a 17in. screen has fallen from $297 last year to $276 this year, as a result of increased production and yields. Competition is already strong, so prices are expected to fall further. Kevin Jeong, a Samsung spokesman, says that the cost of a 40in. LCD TV set should fall from $7,500 to $3,500 by 2005.

It seems that Sharp has decided to concentrate on plasma panels as being more suitable for large-screen TV displays.



Philips has announced Mirror TV, which consists of an LCD TV display integrated into a mirror. It uses polarised mirror technology that enables almost 100 per cent of the light emitted to pass through the reflective surface. Users can also link a laptop or PC to the Mirror TV via a special connector. Screen sizes will be 17, 23 and 30in.

The first products will be aimed at commercial markets such as hotels. Advanced versions that would use wireless technology for connection are currently being tested. Philips says a home version is expected to be available before 2005. Mirror TV will be the first product created at the Philips HomeLab, the company's research 'incubator' for future electronic products and technologies, to reach the market. Deliveries are expected to start by the end of the year. No price details have been given.

Time-limited DVDs

As an alternative to video rental Flexplay, a US company, is marketing a DVD disc that becomes unplayable after 48 hours. Buena Vista, part of the Disney Corporation, is currently test-marketing a small number of titles in four US cities. The disc, known as ED-Z, has been developed in conjunction with GE Plastics. It's coated with a special Lexin resin copolymer that begins to change colour from bright red to black over a preset time when exposed to oxygen. As the disc changes colour a DVD player's optical system finds it increasingly hard to read the disc, until this become impossible. The plastic can be set to change colour over a period of anything between eight and sixty hours. The discs are supplied in vacuum packaging, similar to that used for sliced meat, and remain playable for up to a year in the packaging. According to Flexplay they can be recycled.

The Japanese software company Japan Wave and Matsushita are trying out a new DVD system that uses DVD-R discs which contain film clips. If consumers wish to view the complete film, they pay a small fee to have it downloaded to a PC hard drive and DVD disc. The film can be viewed via the PC or a standard DVD player but is deleted after a preset time.

Business news

Provided Kingfisher shareholders agree at an extraordinary general meeting to be held on July 4 (after we go to press) its electrical businesses, which include the Comet store group, will become a separate entity with its own London Stock Exchange listing, to be known as Kesa Electricals. The business will operate 790 stores in seven European countries. In addition to Comet the chains include Darty and BUT in France, Vanden Borre in Belgium, BCC in the Netherlands and Datart in the Czech Republic and Slovakia.

The Japanese PC monitor manufacturer Iiyama has entered the UK AV market with a range of three projectors. This will be followed by LCD TV sets, starting with a 19in. model that should sell at under £1,000. It will be marketed as a high-resolution multi-function product. 32 and 40in. models will subsequently be added to the range. CKS Entertainment Systems, Berkshire has been appointed as distributor.

The Spanish AV company Vieta, which started as a hi-fi amplifier manufacturer in 1954, has set up a UK subsidiary. The initial range of products will include home-cinema systems, in-car entertainment equipment, DVD players, LCD screens and speaker packages. This will be followed by plasma screens and projectors. Contact details are as follows: Vieta UK, Grimsdells Court, Grimsdells Lane, Amersham, Bucks, HP6 5EL. Phone 01494 723 444, fax 01494 722 533 and www.vieta-uk.com

Instek has appointed Aspen Electronics as UK distributor for its range of test equipment. Aspen can be reached on 020 8868 1311 or 07803 078 050. There are web sites at www.aspen-instek.com www.aspen-electronics.com

The Tele-Lift

The Dixon (Grant Dixon, not Dixons) Tele-Lift, designed to enable TV sets of whatever size and weight to be lifted and transported without injury to those involved, is now being marketed by an agent in Chester. Contact details are as follows:
email sales@liftingsystems.co.uk
phone 08700114326
www.liftingsystems.co.uk
address 60 Haytor Road, Garden Village, Wrexham, LL11 2PU.

A variety of attachments to suit all

Institutions plan merger

The Institution Electrical Engineers (IEE), the Institution of Incorporated Engineers (IIE) and the Institution of Mechanical Engineers (IMechE) have announced plans to merge to create a single institution with greater authority. Voting by members is expected to take place in the autumn. The IEE and the IMechE were both established in the 19th century, while the IIE was formed in 1998 from the merger of two technician institutions. At present the IEE has some 130,000 members, the IIE about 40,000 and the IMechE about 80,000.

Vintage communications fair

This year's National Vintage Communications Fair, the eleventh, will be held at Hall 11, the National Exhibition Centre, Birmingham on 28 September between 10.30 a.m. and 4 p.m. Admission is £5 (under 14s free). Some 300 stallholders will have vintage equipment of all types, plus records and scientific instruments, for sale. For further details phone organiser Terry Martini on 07947 460 161, email info@nvcf.org.uk or check at www.bvws.org.uk



It has always been preferable to try to sort things out in the customer's home if possible. With many sets bigger and heavier than ever, it is now sometimes almost essential. Ian Rees has been involved in this type of work for over forty years and gives his advice on how to go about it successfully

Practical field servicing

Whether the emphasis should be on workshop or on-site servicing has changed many times over the years. Field servicing can be a simple snatch-and-grab support for the workshop, or it can cope with all breakdowns. During the forty years I've been in the trade there has been seesawing between these extremes – and all points between.

Historical perspective

When I first became involved with consumer electronics in the Sixties the reliability of domestic equipment was poor. It was normal to carry out several warranty repairs during the guarantee period, especially with TV sets. Eighty per cent or more of these repairs were done on side. Reliability didn't improve when semiconductor devices started to replace valves – it even got worse for a time. Because of the lack of suitably-trained engineers, manufacturers started to build their sets in modular form so that plug-in panels could be exchanged and repaired.

This brought its own problems. It enabled semi-skilled engineers to carry out field servicing, but the poor repair standard of serviced panels made reliability worse. A scatter-gun approach was often adopted, with more than one panel replaced in an attempt to cure a fault quickly. The confusion that arose when good working boards were mixed with faulty and returned-for-repair or stock ones made weeding out intermittent panels very difficult. Many workshops moved to servicing their own panels (at what would now be called 'component level'), using jigs that consisted of a skeleton chassis.

I remember it being a very unsatisfactory and stressful time, with large numbers of faulty or unreliable panels sloshing around in the system. The scarcity of new panels often resulted in old, scruffy serviced boards being supplied by manufacturers as advance replacements. These 'seconds' often had to be fitted (if customers didn't see) in brand-new sets. When Far Eastern manufacturers entered the UK market their sets were generally far more reliable than home-produced brands, and they tended not to be of modular construction. Early small-screen colour sets like the Sony ones had terrible, hand-built rat's nests inside, but had a performance and reliability that UK producers could only dream of. UK suppliers forecast that the Japanese would not be able to maintain their quality and reliability when screen sizes increased. How wrong they were!

The need to support poor-quality UK-manufactured domestic equipment in the field and the workshop continued for some time. Sadly the lessons were only slowly learnt, too late for some UK manufacturers. There was another aspect as price competition increased. Modular chassis construction is expensive, calling for a metal frame and lots of plugs and sockets and inter-panel wiring. It's much cheaper to get everything on to a single standard-size PCB and, as reliability increased, this is the way things went. The need for extensive service back-up had been a burden on the trade. Reliability increased as the causes of component failures were analysed and manufacturing techniques improved.

The call for servicing gradually decreased until today's situation was reached, where many products are regarded as scrap when faulty. But at the higher end of the market sets are becoming bigger, more elaborate and more expensive. Owners who have paid a

thousand or more for a TV set or a hi-fi installation will think twice about scrapping it. There is also the environmental aspect. Disposal of equipment is becoming expensive, and recycling is in vogue. So the demand for repair and servicing is likely to increase – at a time when there are fewer and fewer trained engineers able to carry out the work. The repair of faulty appliances to extend their life has always been the best and most useful method of recycling.

Aim

I have trained and followed up many field engineers and have been surprised at how quickly they give up, declaring equipment scrap. Customers often have to pay for a call-out and the advice offered. But a few questions and observations, and maybe some simple tests, will often solve a problem and restore correct operation. Hopefully this article will encourage field engineers to go a little deeper. It covers the most basic aspects of field servicing.

Typical scenario

It's always desirable to be prepared when making a service call. But in the real world this is not always possible. Let me set out a basic scenario, one with which many engineers will be familiar. You are sent to service a piece of faulty equipment with which you are not particularly familiar and you have no information. We needn't be concerned about the type of equipment, because the same basic procedures apply to all.

Asking the right questions before you start can shorten diagnostic time and prevent false moves. What is the equipment's history? Is it new? Had it been working correctly? How was it being used when it failed? Had it shown signs of malfunctioning before failure? Had anyone looked at it before you?

For many reasons the questions will not always be answered honestly or with full knowledge. So treat what you hear with care. Getting the information from the user is better than via a third party. If possible, try to get a demonstration of the fault by the user. Watch what they do and the way they do it. Diplomacy and sympathy are important. You may be the first caller or the latest of many who have gone before. The owner is often in an aggravated state, and may be difficult to handle.

The second stage, inspection, is just as important and can confirm any information supplied. Older service engineers were taught that smell is often the first sense to bring into use as an aid to diagnosis. While an external inspection is being carried out, sniffing around ventilation grills may reveal tell-tale aromas. Are the fixing screws and covers all in place and unmarked? This may show that no one has gone in before you. If you are very lucky there may be security seals to confirm this. Visual inspection should also take in the possibility of mechanical damage. Look for cracks or damage to the outer casing of the equipment.

Passive tests and inspection

Depending on the equipment and the nature of the fault, a decision has to be made as to whether active or passive tests are carried out first. A lot of time can be saved if an active (powered-up) test can be carried out without adding to the problems. But I prefer to carry out a full or partial passive test before any active testing.

A multimeter is the minimum equipment you would normally have available. These days they come in a multitude of combinations with other test functions, but the basic instrument is usually sufficient. Digital instruments are now the norm, but analogue ones can perform tricks that digital ones can't. For this type of work it's important that a digital type can test diode junctions.

So, with power disconnected and covers removed, internal passive inspection and testing can start. The source of any smells detected at the initial stage can be traced. Usually there will be visual signs as well. Good lighting and possibly optical magnification are an advantage. In poorly-lit situations I prefer to use a battery-operated map magnifier with a built-in light source. This has the advantage of narrowing down the field of view to small areas that can be examined in detail. A clip-on mains inspection light is usually more convenient for general illumination.

Fuses

Easy to locate clear-glass fuses provide a good indication of the nature of a failure. Glass that has been discoloured or burst (hard blows) indicates a low-impedance short that should be easy to trace by resistance checks. The cause is often a short-circuit diode or capacitor in an AC supply circuit, or a short-circuit chopper device, stabiliser or power oscillator/amplifier. Note that a surge-limiter resistor may go open-circuit and leave the associated fuse intact, so watch out for this.

Fuses that have blown with no sign of an explosive rupture, i.e. soft blow, may have failed for more subtle reasons or sometimes just old age – fuse elements are stressed each time the equipment is switched on, so you often get failure with time. This sort of thing is aggravated by high working temperature, where the ventilation is inadequate.

Incorrect fuse type or rating is a sure sign that someone else has been there before you. And even in these times silver paper around fuses is not unknown, resulting in vaporised printed-circuit tracks or wiring etc. In spite of the temptation to uprate a fuse, the manufacturer's specification must be adhered to in order to prevent legal infringement with a designated safety



The author's mains isolation unit for field servicing.

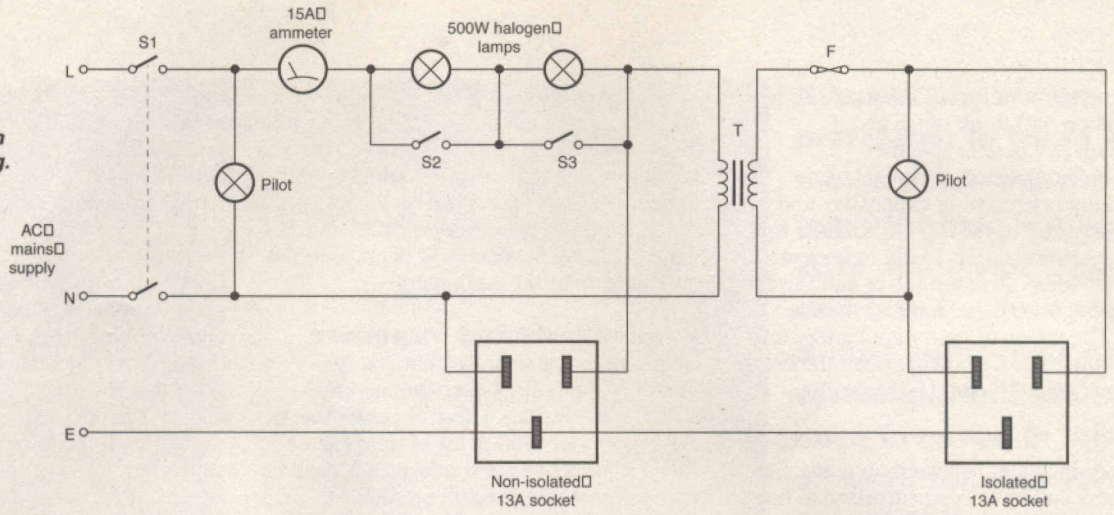


Fig. 1: Mains isolation unit for field servicing.

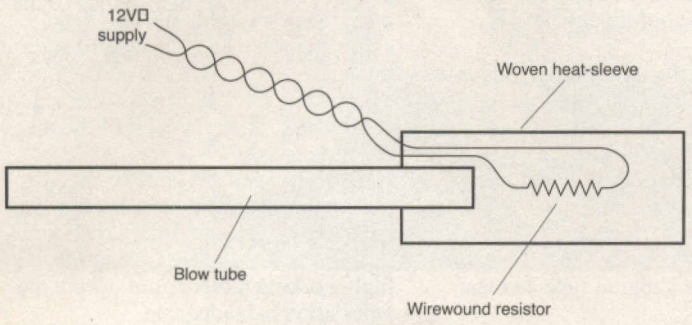


Fig. 2: Hot-air heater for fault-finding.

device. Sometimes a manufacturer carries out a fuse uprating, but don't make any assumptions about this.

Other observations

Examine preset adjustments to see if they have been tampered with. Not all are paint-locked however. Manufacturers select values carefully so, when correctly set, I would expect a control to be somewhere near the centre of its range. Presets that are at one end of their range have been twiddled. It's not a good idea at this stage to try to reset them, but make a note for possible action later.

If the casing is damaged the PCBs inside must be checked for cracks or damage. Look for that old favourite, faulty soldered joints, using the magnifier as necessary. There's a greater likelihood of defective joints in certain circuit areas. Most are found where hot components conduct heat from their connections. High RF currents can also cause local heating, which leads to the same problem.

Heavy components fitted on a board without through mounting to a strong point can flex and break loose, often cracking the board. A common problem, liquid spillage, can be seen from the stains left. This fault may not be admitted. Well-watered pots of plants or drink spills are often the cause, but will probably not be in evidence when you call.

Note signs of overheating on panels and components. Also note capacitors that bulge or have signs of electrolyte discharge and discoloured, distressed resistors or semiconductor devices. Any other components in trouble should be marked.

Assessment

The general internal examination has now been completed. Before you take any action, carefully consider the evidence found. Think of possible causes and effects, and rank them in order of likelihood. Each possibility can then be investigated. Be careful about this. Corrective action may cover further symptoms, result in the destruction of new replacement devices that might well be expensive, and possibly increase the damage.

No matter how complicated the equipment being investigated, remember that it's basically just a collection of components connected together. The characteristics of many of these components should be known.

Trained engineers will be familiar with the circuit sections – power supply, control, audio, timebases and so on. The main ones should be easy enough to identify. It will probably save time to sketch the positions of important components and test points, particularly in power supplies, on a piece of paper. PCBs are usually well marked, which is a great aid to identification. Tracing circuit tracks or wiring from an identified known device back across a panel is something that requires care and patience.

Testing

Depending on the symptoms, passive electrical tests to locate faulty components are the next step. As a precaution, check whether any of the electrolytic capacitors carry a stored charge. This could damage your meter or, worse, result in a nasty personal electric shock. Resistance checks across reservoir, smoothing and decoupling capacitors connected to the supply lines will give you an instant indication of the presence of any catastrophic shorts. Ohm's Law gives an indication of the likely current flow, based on the working voltage of an electrolytic capacitor less about fifteen per cent. With a low-resistance reading there may be supporting evidence in the form of a hard-blown fuse or an open-circuit surge-limiting or decoupling resistor. Causes may be short-circuit transistors, ICs, diodes or capacitors, either singly or in combination.

The ohmmeter leads should be reversed after each reading so that a diode in the circuit can be sensed. A nice characteristic of analogue multimeters is the lazy swing of the meter needle. After a bit of experience you will find that the slow swing and fall back of the needle gives an indication of the charging of a capacitor. Quick damping of the needle shows if parallel resistance is present.

Two-way resistance checks on power transistors and diodes to test their junctions can be done quickly without the need to unsolder them. Unplugging sections or desoldering component supply

pins can isolate suspected short-circuit components that are shunted by a low resistance. In-circuit component testers can be useful, but they can cause confusion if you are not familiar with the results to expect in different circumstances. Removal of a suspect component or its isolation from the circuit is the only sure way of testing it.

Methodical inspection and testing should continue as necessary. As during the visual inspection stage, take care that any failures you find are causes and not symptoms. Expensive replacement components may be fitted only to be destroyed at switch on. Finding and replacing a faulty component without checking for the possible cause and effect can be a waste of time – and costly.

The inspection and testing procedure described above may seem long-winded when written down like this. In fact the tests can be carried out quickly, and focus the mind, saving time as the diagnosis continues.

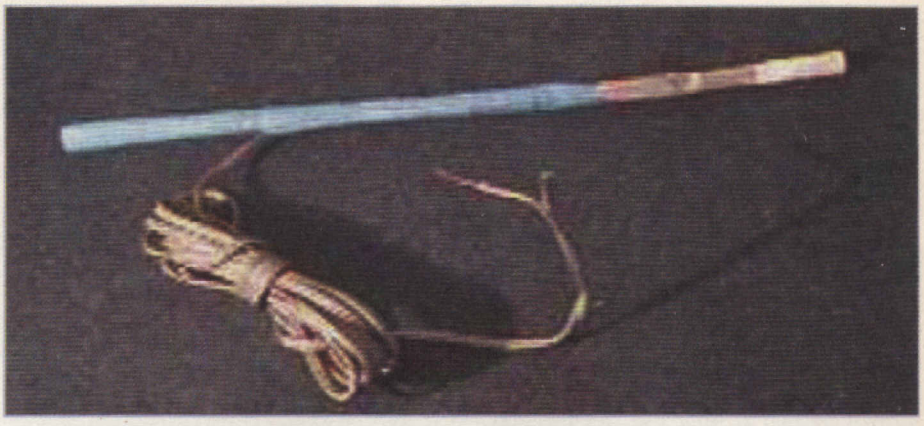
Supply buffering

Any active tests on site have to be carried out ensuring, in these safety-conscious times, that no personal injury can be done either to you or to third parties. This may involve the use of an isolated mains supply and specially prepared and screened-off areas.

Fig. 1 shows a mains supply isolation unit specifically designed for field servicing. It incorporates two 500W, 240V halogen floodlight bulbs in series to buffer the mains supply. They can be switched into circuit by means of S2 and S3, limiting the current fed to the equipment under test to 1A or 2A. The alternative to this simple approach would be a heavy and expensive Variac.

The isolation transformer T is chosen to suit the type of work expected. For general servicing I would suggest a rating of between 250 and 500VA. The one in my prototype is a 500VA toroidal transformer. These can be obtained cheaply from DIY stores and enable the unit to be mounted flat in a plastic drill-gun storage case. An AC ammeter is included to monitor the mains current via the unit. The only care needed in the unit's construction is to ensure that the halogen lamps are mounted in their holders in such a way that they don't melt the casing.

An alternative buffer for use with battery-powered or low-voltage equipment is a 12V or 24V vehicle headlight bulb. The dip and beam filaments can be wired singly, in series or parallel. This is simple to implement with three flyleads terminated with crocodile clips that are crimped or soldered to the bulb. The bulb can be connected in line or clipped on to empty supply fuse holders. The configured bulb filaments absorb and limit any excess current.



Hot-air heater for fault-finding.

A simple example of this is where a high-power, DC-coupled amplifier causes high currents to flow when connected to a supply. With the limiting bulb in place, active measurements can be made (albeit at reduced voltage) and compared with the other, known-good stereo stage. The alternative would be the slow process of passive checking individual components through the circuit channel.

Active testing

At this stage in the proceedings you will, when the equipment is powered, have either a full, part or no repair from the passive action undertaken so far. Before continuing, an attempt should be made to confirm the fault as reported. Make notes of any further symptoms at power up.

Check the various supply lines, using the simple drawings made of the circuit blocks. Work from the highest voltages in the supply chain, systematically moving down through decoupled lines and stabilisers to the circuit sections fed. You may well find anomalies. I find that it is often possible, using these readings only, to get close to the cause of the fault.

Fuses can be present in many guises other than the common tubular type. Wickman, Polyswitch, mini-axial and thermal types in all sorts of encapsulations are in use and some may look unfamiliar. Safety resistors used as fuses to isolate a faulty stage can often be overlooked and may be detected only by continuity or voltage checks. In older equipment a strand of fusewire may be soldered between two convenient points. If the wire has vaporised, you may be left scratching your head as to why nothing connects the two circuit sections.

Power supplies

No matter how complex the piece of equipment, its power supply remains one of the weakest points. Fortunately many faults are straightforward and easy to trace, especially with a linear power supply. In the case of switch-mode ('chopper') power supplies you can often hear, as a slow ticking or a squealing sound, that the supply has shut down in a protected mode. Experience may well enable you to link such sounds to the cause of the trouble.

I keep a list of pin voltages for the more common switch-mode control/driver ICs. This may reveal the status of a supply. Many circuits have built-in protective shut-down lines to prevent damage from/to other stages.

If initial tests have been skipped a lot of time can be wasted trying to service a power supply that's perfectly OK. Previous passive tests should have eliminated the various rectifier diodes that go short-circuit on the secondary side. When faced with a faulty switch-mode power supply I suspect first high-value resistors then the small-value electrolytic capacitors that infest these circuits. Usually 1-100μF, 16-50V DC types are to blame. They can be replaced one by one as a matter of routine. Replacing capacitors that are mounted in hot spots will often clear a fault. The outer insulating sleeves of many capacitors change colour after being subjected to heat. Compare with those of similar type mounted in cooler spots. Internal capacitor heating also causes colour change. An ESR meter is the one instrument that can be used to identify faulty electrolytic capacitors in-circuit without the need to remove them. I've found checks with capacitance meters to be all but useless. Only an ESR meter can identify faulty electrolytics accurately.

Temperature effects

It can be useful, after a short period of running, to switch off and check the temperature rise of components. Use of freezer sprays can help with diagnosis, but the results have to be treated with care. Many circuits are temperature-sensitive, especially to a large drop in temperature, and will alter their performance quite normally. The frost produced on the surface of many ICs can produce strange effects.

A hairdryer can be helpful for fault-

finding, but the wide, uncontrollable air blast makes screening areas that don't need to be treated very difficult. To overcome this problem I've made a simple hot-air heater that works well (see Fig. 2). It consists of a small plastic or stiff cardboard tube with a piece of woven, heat-resistant sleeve fitted at the end. A 25Ω, 6W axial wirewound resistor is pushed snugly into the sleeve and is crimped to a length of twin supply cable that's connected to a 12V source. When thus connected the resistor heats up. Blowing down the tube over the heated resistor creates a small hot-air spot that can be directed on to a suspect component accurately with no need for screening. This heating technique enables faults to be induced in a more realistic way than with the use of freezer. If required, a rapid change from hot to cold can be brought about with a brief blast of freezer.

Digital multimeters

Digital multimeters have two big advantages in comparison with standard analogue instruments. First is their high input impedance, second their ability to measure down to a few millivolts. On the AC ranges this makes them useful for signal tracing at up to RF. To do this an 0·1μF blocking capacitor needs to be fitted to the end of the probe. This enables you to check that oscillators are running and that there is stage gain.

Current readings are not easy to take without breaking into a circuit, except across an empty fuseholder. If things go wrong, there's a high risk of damage to the meter or the circuit. For this reason most field engineers prefer to take a voltage reading across a series-connected resistor in circuit and do a little Ohm's Law work to determine the current.

The instrument I use is a small auto-ranging pencil type with a memory-hold button to freeze the reading. It also has a built-in buzzer, which makes it ideal for circuit tracing without the need to look at a scale.

Digital circuitry

Digital circuits can be checked for activity. Logic states can be seen easily with a meter. Fast-switching circuits can be traced using the AC range and a blocking capacitor, but at this point I have to admit that field servicing is getting close to the limit. For fault diagnosis with equipment of this type circuit information and an oscilloscope at least are required. I can get a little further with a logic probe, but only with familiar ICs.

Complex equipment

I'm the first to admit that luck plays a part when trying to diagnose the cause of faults in complex equipment. But the luck is usually within the context of conventional tests. An off-beat clue or some contradictory readings will often lead you to the cause of a problem.

But the worst thing to do is to go hi-tech too soon. I try to stay in touch with the ordinary, and not to get sidelined by what could be red herrings when there is still a logical path to follow. When logical testing runs out, other possibilities may be considered.

Tools and equipment

I've tried in this article to concentrate on basic, non-specific diagnostic procedures that can be applied in any type of electronic field servicing. Engineers in the field may be called upon to tackle a wide range of equipment. Hopefully they can select their tools, equipment and spares to meet their particular requirements.

It's said that investing in a good set of hand-tools repays the cost many times over. Unfortunately tools just vanish in the field! I use basic, cheap disposable tools, keeping the good stuff back in the workshop.

A gas soldering iron is ideal for simple work, but a mains-powered pencil type is essential for close work. Battery-operated types can be exasperating when they die in the middle of a job. Solder braid is preferable to suckers for desoldering components. I can work on most types of circuits with this kit, but admit that surface-mounted components are something I'd rather deal with in the workshop, and will tackle in the field only when there's an emergency.

Security fixings are used on more and more equipment. This became a problem several years ago. Kits that contain the special tool bits can now be obtained very cheaply. Screwdriver socket kits are useful, but are often too clumsy to use on a lot of equipment. Screwdrivers with long, slim shafts are best for dismantling equipment. Battery-operated drill guns are very useful as power screwdrivers. They save much tiring wrist action when a lot of dismantling has to be done. The best types have a clutch mechanism that can be set to prevent ripping screws through soft plastic casing on reassembly.

Long mains-extension leads with 13 and 16A plug connectors are essential. Some industrial sites have no convenient power outlet. The few there are usually have plugs that cannot be disconnected in them. Adapters can be used with 13A outlets, but special leads with in-line sockets have to be made to adapt 16A types. This enables the resident plug to continue in operation while you tap in.

The final choice of tools and equipment obviously depends on the type of service you provide. I'm not a specialist, so I usually take the kitchen sink! It's often not required, but is better than having to keep popping back to the workshop.

Spares

Since I've decided to be non-specific in this article, detailed spares suggestions cannot be made. Initial field calls may not require spares. In the Sixties a box of assorted valves, droppers, capacitors etc. was enough. Sets then used small, cheap discrete components of similar types and, with a few exceptions, ninety per cent of faults could be fixed on site.

Nowadays I just carry a few basics. Field servicing is for me much more of a wing and a prayer. The challenge, especially with industrial control equipment, is to jury rig (without sacrificing safety) to maintain production. Replacement spares or equipment have to be obtained and fitted on the run.

The little domestic work I do has to be considered in relation to the retail replacement value of the equipment. New equipment failures are often caused by poor installation or operating problems that the customer cannot solve. Stack 'em high, sell 'em cheap then stick them with a big bill for installation or setting up is a widespread sales practice today. The public's adoption of scrapping just outside the guarantee is widespread, unless they have been sold an expensive maintenance contract.

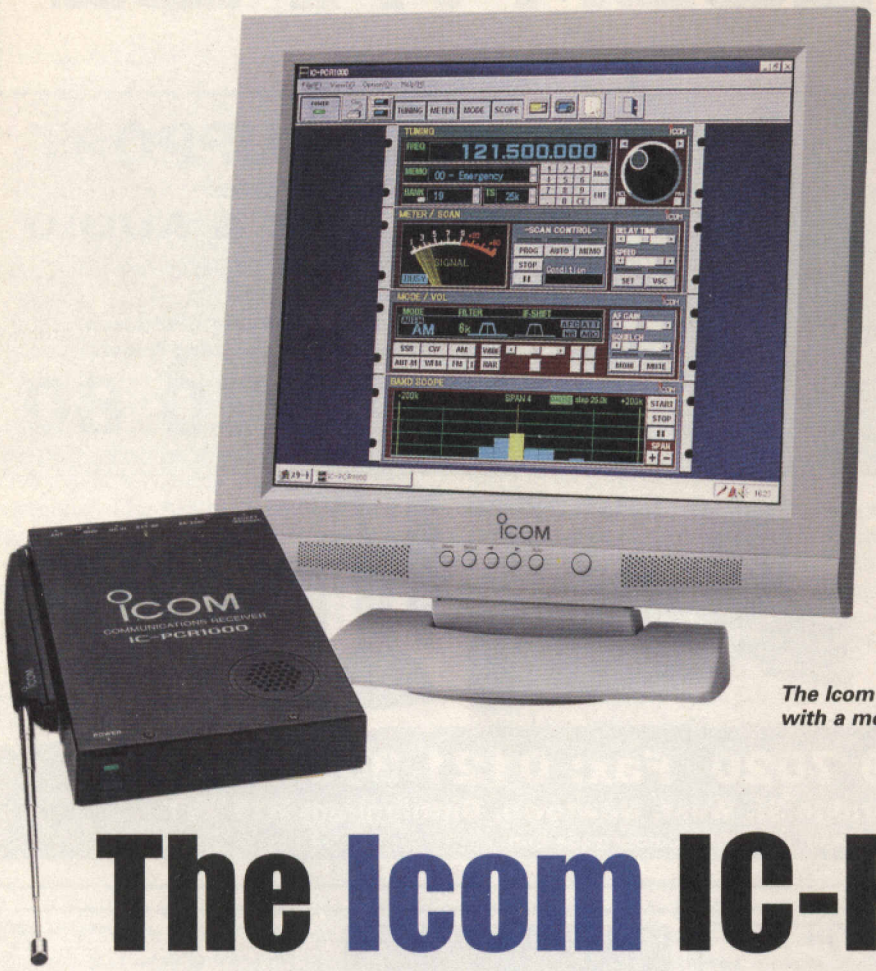
Industrial manufacturers tend to discourage third parties from muscling in on their lucrative contract-servicing business. So you won't get much help with technical information. Many domestic appliance suppliers will provide information and spares only through their agents. The cost of spares and the difficulty and delays make many jobs uneconomic.

In the face of all this I find the internet a very useful source of information. I carry a palmtop computer, and often go on-line to identify components and suppliers. Even putting component numbers on their own into search engines like Google can produce an amazing amount of information. The CD catalogues produced by RS and other suppliers have data sheets on them and can be very helpful. Unhelpful manufacturers can often be bypassed by obtaining components direct from the suppliers. If your order is too small, they will often direct you to an agent.

In conclusion

If it is to be successful without recalls, field servicing of all types calls for a methodical approach. Sometimes reliability, or the economics involved, mean you have to confirm that the equipment should be scrapped. But at least the customer will have had an honest appraisal of the situation. ■

Test report:



This sleek little communications receiver works in conjunction with a PC. It can be a great help for DX reception, in particular for checking signal parameters to identify the source. Cyril Willis describes the technique and the operation of the IC-PCR1000

The Icom IC-PCR1000 communications receiver with a monitor displaying the component screen.

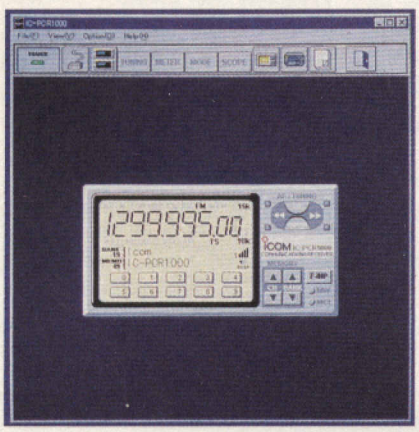
The Icom IC-PCR1000

Desktop scanner-receivers have been used by TV-DXers for several years to find and identify signals. They are now widely used to check for TV carriers, TV sound, the maximum usable frequency (MUF) when the F2 layer is active, and to check for Band I activity during the Sporadic E season and tropospheric lifts.

More recently several TV-DXers have taken scanner-receiver use a step further – by using the scanner to measure TV transmitter offset frequencies. This has proved to be a highly effective way of identifying even very long-distance and extremely weak signals that are not strong enough to produce a video display. The programs used for this are DigiPan and/or Spectrumlab, which are both available as free downloads from the internet. Go to:

http://www.digipan.net/ or

http://kf4houtn.tripod.com/id70.htm



PC monitor display of the radio screen.

By running a lead from the scanner's line output to your PC sound card's line input, either program will show a trace line for any transmitter(s) being received. Then, by clicking on the line with your mouse, you will see a frequency displayed. After a few quick calculations the transmitter can usually be identified. This subject will be covered in a follow-up article. It's a giant leap forward from gazing at fuzzy images and trying to read test-card identifications and decipher logos. With the purely visual approach you may be able to identify the service but still not know which transmitter the signal has come from.

I have been using an Icom R7000 scanner-receiver for this purpose for over a year. Having recently travelled abroad on holiday/dxpeditions, I was looking for ways of lightening the load. One way to do this is to go for a PC scanner-receiver. At present there's a choice of two: Win Radio and the Icom IC-PCR1000. According to reviews I've read elsewhere, Win Radio is the better scanner and the Icom IC-PCR1000 the better receiver. As the Icom is used by several TV-DXers, it seemed the obvious choice. It has been available for some time, since 1999 I believe, and has been recently upgraded. By using it you can integrate both frequency-measuring software and scanner-receiver software on to your PC and/or laptop, getting away from bulky desktop units and making everything neater and controllable from your computer.

Description

The IC-PCR1000 is a very sleek external plug-and-play PC device about the size of a paperback book. Dimensions are 127·5mm wide, 30mm high, 199mm deep, weight being approximately 1kg. It fits neatly into a laptop case, so you can make your hobby mobile if you wish. It will operate with a laptop computer when it's supplied with power from a car battery, a 12V power source or the 240V AC adapter supplied. There is nothing to be fitted inside the computer, such as a card, so you don't have to remove the case. You just connect the RS232C 9-pin serial port

cable supplied between your unit and PC, connect an aerial to the 50Ω BNC socket, and load the software from the floppy discs. A small telescopic aerial and cable with BNC are provided, but I feel that they are more for mobile/temporary use. The unit deserves something bigger and better! The software is installed from two floppy discs.

The wideband coverage is from 0·01-1,300MHz in all modes – AM, FM, WFM, SSB, USB, LSB and CW. The unit has a high-performance PLL circuit, an unlimited number of memory channels, a digital AFC circuit to compensate for frequency drift in the FM mode, a real-time band-scope function with ±200kHz range, a built-in CTCSS tone squelch, tuneable bandpass filters for the VHF/UHF bands, IF shift, voice-scan control, S-meter squelch, a large selection of tuning steps, a noise blanker, a variety of scans, tone squelch, an RF attenuator (20dB) and AGC for the SSB, CW and AM modes.

Interface screens

There's a choice of three user-interface screens: communications receiver, component and radio.

The communications-receiver screen has an S-meter (signal strength), a large frequency readout, a keyboard and in fact just about everything you would expect to find on the front of a typical communications receiver.

The component screen has four sections: tuning, meter/scan, mode/volume and band scope. It's ideal for those familiar with full-function communications receivers.

The radio screen provides the simplest operation, with ten memory channel buttons and a frequency readout, similar to an AM/FM radio with buttons.

One gripe is with the component screen: when in the SSB mode with band scope running there's no sound. So at switch on you have to click on the band-scope button to disable it and enable the sound to be heard. The communications receiver screen opens with band scope disabled, so no problem here. The radio screen does not have a band scope.

Interference

There was quite a lot of interference from the PC and various nearby TV sets on LW/MW. But bear in mind that I use TV aerials with preamplifiers. Probably a decent aerial for these frequencies and higher, such as a Wellbrook ALA1530, would overcome the problem. SW reception was not affected that much by this interference, and VHF/UHF was interference-free apart from the usual baby alarms etc.

The PC

System requirements are a PC with a 486DX4, Pentium 100 or higher CPU; 16MB of RAM; 10MB of free hard-disk space; and a VGA or SVGA screen.

My version of the IC-PCR1000, revision 1.31, runs with Microsoft Windows 95, 98, ME, NT, 2000 and XP. In addition to the Icom radio-control software there's a CD of Bonito software containing Board Terminal, ProMeteo, a simple chart-plotter NMEA-tool, a RadioFax Schedule List (demo tests) plus the RadioCom programme that I have yet to try – see www. bonito.net

Various DX/ham websites recommend using TalkPCR, which again I haven't as yet tried. It can also be downloaded free from the internet, and you can get Icom software updates. Go to www.icomamerica.com

Performance

I found the IC-PCR1000 to have comparable VHF/UHF performance to my old Icom R7000. Operation is very easy and straightforward. It's great for beginners, as it has an auto-mode function that selects the appropriate mode for each frequency band.

The IC-PCR1000 is simple to set up. Within seconds I was inputting frequencies by just typing them on the PC keyboard and hitting 'enter'. Storing them in the built-in memory database is also very simple and quick to do. Tuning is via the mouse: move the cursor to the tuning knob and click the left mouse button to tune down and the right mouse button to tune up. It didn't appear to tune using the mouse wheel however, but operation is simplicity itself and setting alteration is just a mouse click away.

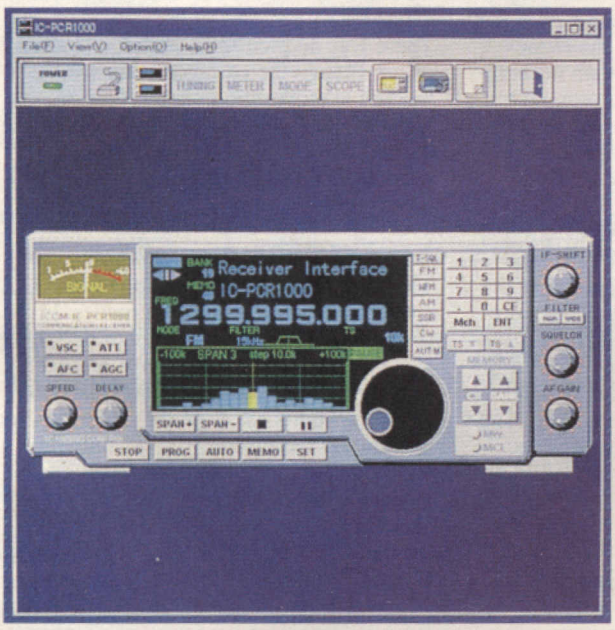
Once you have found your way around, the IC-PCR1000 is much quicker to operate than a desktop receiver. If you are used to operating computers at work or just now and then, the IC-PCR1000 is a pleasure to use and lots of fun. The seasoned radio ham might disagree, perhaps preferring a serious, hands-on clunk-click machine, but I am convinced that PC operation is the way of the future. These PC-based receivers are improving all the time. I feel that those big old desktop receivers could become defunct in a very short time: after all, look what happened to the typewriter.

One fantastic add-on would be an on-screen TV. The R7000 has an accessory that can be attached to the side, so I guess it would be possible to include this by using a PCTV card. With all that on a laptop you would have the ultimate mobile DX-TV machine!

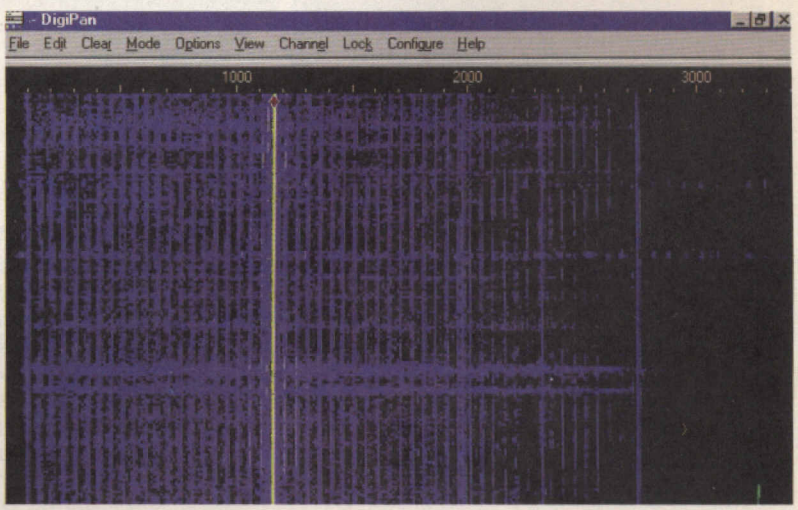
Availability

The price of the Icom IC-PCR1000 varies. I bought mine from Haydon Communications last December for £349.95, which was the best deal I could find at the time. I have seen it advertised for about £300 recently.

You can test drive the IC-PCR1000 at http://www.swl-ute.com/pcr-1000.htm or download the program at http://www.javiation.co.uk/pcr1000.html ■



Monitor display of the communications-receiver screen.



DigiPan screen grab of ch. E3 Izana, Tenerife, Canary Islands.



Service Casebook

Michael Maurice

Sony KVD2512U (AE1A/B chassis)

Various faults can be present when these sets are switched on from cold. They include no power, low sound, no sound and distorted sound. Go to the power supply and replace C615 (1,000μF, 35V) and C622 (2,200μF, 16V). This should clear the problem.

Salora 24K70

There was a bright white raster with the sound OK. If you looked carefully, you could see some sort of picture behind the overall whiteness. A quick check on the 200V supply to the RGB output stages showed that this was present and correct. The set was an imported version from Germany, and had been fitted with what I can only assume is a Secam transcoder module. A TDA3590 chip lives on this module. Fitting a replacement cured the fault.

Sharp VC-MH711HM

This was an interesting fault, the complaint being no tape playback. There was a prerecorded tape inside. When play was pressed the counter didn't move. Going to cue produced some sort of picture, but when you went to review the picture cut out after a few seconds.

There was in fact nothing wrong with the drum, the ACE head or any of the playback circuits. The machine was permanently erasing because Q552, which switches the erase amplifier on and off, was short-circuit. A replacement transistor cured the fault, but a few of the customer's tapes had been ruined.

Sony KVE2932U (AE2 chassis)

This fault was intermittent. The set would start, then sometimes the screen would just have a strange glow on it, or sometimes you'd get a bright white line then nothing at all. If you get these symptoms, or when the set comes in for service, remove signals panel A and resolder the connections to the TDA8138A 5V/12V regulator IC681.

Ferguson 59J7 (TX100 chassis)

There were two faults with this set. The first was a black band at the bottom of the screen and poor field linearity. The cause of this was C101 (6·8μF) in the height/field linearity network. It was open-circuit. Note that its value varies with model, depending on the tube. It may be 3·3μF or 10μF. The other fault was intermittent loss of sync. This was caused by intermittent failure of the chopper transformer.

Sony STR-NX1

This audio system would go into standby when it was connected to the mains supply. It would also come out of standby, and the backlight for the display would light up. But nothing else happened. There was no display and no sound.

After watching me check various things on the transformer board and the main PCB the owner casually mentioned that he'd taken the thing to pieces because the volume control was erratic. The penny then dropped: he'd inadvertently disconnected the small ribbon cable from the front operation PCB. I had to remove this board to refit the cable, and while I was at it I cleaned the volume control. In this unit the control is in fact a digital rotary encoder. After reassembling the unit everything was OK.

Beko 15225NX

This set was dead because the line output transformer was faulty. After fitting a replacement the set came on but I couldn't set up the A1 voltage and the grey-scale was out. I eventually found that R1237 on the CRT base PCB was open-circuit. Once this had been replaced I was able to set up the A1 and focus voltages for a normal picture.

Akai CT2870

Once this set had warmed up there were flyback lines at the bottom of the picture. A replacement TDA3654 field output chip cured the fault.

Sony KVM2101U (BE2 chassis)

There was intermittent momentary loss of colour or half a picture with colour and flashing. The cause was a dry-joint at the earth connection for the focus section of the line output transformer.

Philips 21PT5322-05 (MD1.2 chassis)

There was no picture or sound, just a blank raster, though the on-screen displays worked and operation via the scart socket was OK. The cause of the trouble was transistor Tr7100 (BC848B) in the tuner/IF section. It's a signals buffer (emitter-follower).

Sony SLV625UB

There were wild variations in the tape speed in the play and record modes. In addition the eject button worked very intermittently. The first fault was overcome by slightly moving the FG pickup head closer to the capstan's rotor, on the understanding that should the machine fail again within six months a new motor would have to be fitted but labour would be free of charge. The intermittent eject fault was caused by a dry-joint on the switch. A new pinch-roller assembly completed the job.



DVD

Fault reports from Geoff Darby

We welcome fault reports from readers – payment for each fault is made after publication. See page 617 for details of where and how to send reports.

Sony DVD-NS300

Don't confuse this with the DAV-S300! The unit wouldn't read discs of any type. It tried to spin them, with much servo squealing, but never made it. If it was given help it would get the disc to rotate, but not at anything like the correct speed.

As the KHM250AAA deck is very easy to replace I fitted a new one. After that the unit worked correctly. But I suspected the spindle motor rather than the laser, even though it felt OK.

When I examined the turntable position I saw that the top of the motor's shaft is level with a lip in the turntable moulding. It was therefore an easy matter to remove the motor from an almost-new KHM220 deck, which had been consigned to the junk box because of a defective laser, and fit it in the unit's original deck. Resetting the turntable height was straightforward, accomplished by gently pushing it down the shaft until the shaft top was again level with the lip.

When the deck was refitted, the unit spun all discs and read them without difficulty. This saved the customer the high cost of a replacement deck, and once again proved the worth of a junk box.

The repair was completed by running the internal auto-setup program to compensate for wear and any minute differences in turntable position.

Sanyo JCX-TS750 Home theatre

This multichannel DVD/amplifier's sound would come and go with an alarming bang. It also produced a sort of hum, like a swarm of angry bees, from time to time. The owner described these symptoms as "feedback through all speakers".

Fortunately the fault could be instigated by applying pressure to the power supply regulator board, which is located at the rear left. Once this board had been removed, multiple dry-joints were seen at the pins of the three regulators at the heatsink edge of the board. Reworking these with fresh solder cured the fault.

Panasonic SA-HT70

I've had two of these DVD players within a week. This was odd, as I'd never seen one before – though I've encountered a number of the brother HT80s.

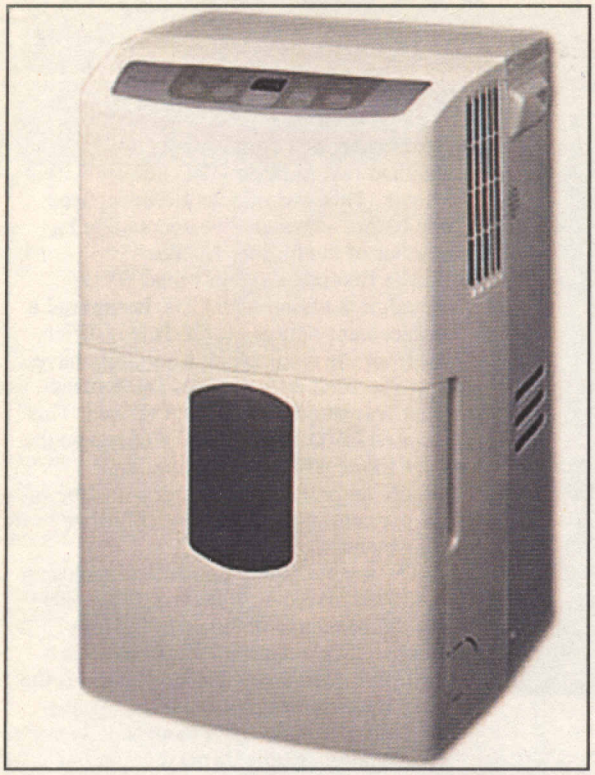
The first one wouldn't read DVDs, though it was fine with CDs. It required a replacement optical block. This is different from the type, which I normally have in stock, used in the HT80. The replacement was fitted as soon as it arrived. This restored DVD playing, and a check on the jitter figure (front panel 'stop' and remote-control '5') produced a reading of 7·5 per cent, indicating that no further adjustment was required.

The second player had difficulty closing its drawer all the way. It stuck at the very last moment, and would go home fully only with a good push. This resulted in a loud click each time. The mechanism is the same basic five-changer fitted in many Panasonic/Technics hi-fi models. It's easy to recognise, as it holds the discs in free space at the back, each separated from the one above and below by a plastic ring.

Timing problems with these decks are usually limited to the tray itself, and are easy to correct. Panasonic provides a spare drive gear, moulded into the top of the deck's plastic, to assist with mechanism checking. Cut it out and fit it on the end of a small-gauge hex driver (the jewellers' type is ideal). If you then look under the deck you will see the edge of the main drive gear and, by the side of it, a small hole. This is to locate the tip of the hex driver. The spare gear will then mesh with the main drive gear, enabling this to be turned to put the mechanism through its paces manually.

Rotate the gear until the tray starts to open. Pull it all the way out until it butts up to the plastic clips at either side. Push the clips outwards to enable the tray to be withdrawn fully. All that should now be necessary is to refit the tray correctly. To do this, push the white rolling rack on the underside of the tray all the way to the rear, as far as it will go. Hold it in this position and slide the tray back on to its guides, until the rack meets its drive gear on the main chassis. The next is the important bit: hold the white rack very firmly in the all-the-way-back position and continue to push the tray home, until it clicks past the clips.

Use your recently-made winding tool to check that the tray can be wound in and out smoothly, that the mechanism goes up and down, and that the disc carrier is able to slide off the tray. If any of these functions doesn't work correctly, remove the tray and try again. If the rack moves off the fully-back position by the tiniest amount as you push the tray home, the timing will be off when the tray is refitted fully.



Here's another item that can contribute to your servicing income. Dehumidifiers, which remove moisture and dampness from the air, are costly to buy new and are therefore worth repair. Most faults involve relatively few items. David Benyon explains what's involved

Dehumidifier repairs

A dehumidifier is a device that removes moisture or dampness from the air. They are quite costly items to buy new but are highly desirable, especially for tasks like protecting stored items from rusting and mould growth. There are chemical types, such as anhydrous copper-sulphate and anhydrous silica-gel, but these will not be discussed here. The usual type is based on mechanical refrigeration, using technology similar to that in a domestic refrigerator. However the seasonal use of these machines, and the extra complications they have, means that they are much less reliable than the average fridge.

Motors and timers

A dehumidifier usually has two or three motors. The main one is inside the hermetically-sealed compressor unit, though the motor starter and excess-current protection device are outside the 'pot'. So these components can be replaced.

The second one is the fan motor. These give a lot of trouble, because eventually the oil in the bearings oxidises to gum and as a result the motor won't start. The motor is usually 'impedance protected', so the windings don't burn out and all that is required is a strip down. If the oilite bushes and felts are re-oiled with a turbo-rated, anti-black-sludge 10W grade engine oil the problem will not recur for a long time.

The third motor (if present) is a synchronous clock motor that drives the process timer. Not many machines have one of these now, as a suitable electronic timer can be constructed. Unfortunately some electronic timers use capacitors and very high impedances and are acutely sensitive to dampness. This is somewhat unfortunate, considering the application.

How it works

The compressor is a pump that compresses a refrigerant gas – usually R12, although this is no longer available in most countries because of its alleged effect on the earth's ozone layer. Compressing the gas heats it: when it is cooled in the condenser it turns into a liquid. This high-pressure liquid is then allowed to expand via the expansion valve, which may be an encapsulated spring-loaded valve or may be just a length of capillary tube. On the low-pressure side of this valve the liquid is relieved from pressure and turns back to gas in the evaporator. This is sometimes referred to as the cold-coil. It becomes very cold.

In temperate climates the cold-coil in most machines soon becomes clogged with ice. So the better machines – most of the types sold in the UK – are fitted with hot-gas purge. The 'purge', or defrost, is controlled by the process timer: the usual arrangement is to defrost after about 45 minutes of compressor operation. The purge is controlled by a solenoid valve, which sends the hot gas through the cold-coil. As a result the ice melts and is collected as water in the hopper. Some dehumidifiers, presumably designed for use in hot countries, don't have hot-gas purge, allowing the ice to melt naturally. They are not very effective in the UK and are best avoided.

Fan faults

The sticking fan problem has already been mentioned (see under motors above). Sometimes the sintered-metal bearings stick solidly to the shaft and turn in the spring-loaded housing. When this happens a self-grip wrench on the bush will be needed, but the motor will have to be stripped down to gain access. Even crimped motors can be uncrimped and recrimped (once), but this is rather tiresome to say the least.

Sometimes a fan motor that's been stalled for a long time will have become so hot that the plastic fan is damaged at the hub. If metalworking equipment (and time) is available, it's usually possible to repair the damage by 'letting in' a new hub disc (flat galvanised steel is ideal), using self-tap screws to secure the fan to the new hub. If this method is used, do be sure that the screws are all identical and, to maintain balance, prop-

erly spaced.

A lathe is not necessary to make the disc, just a drill, tinsnips and a grinderette, as the fan motor itself can be used as the lathe spindle. If the fan motor is refastened on the dehumidifer pointing outwards rather than inwards, it can be used to spin the rough-cut disc which can then be sanded down to the perfect size to fit the fan hub. With a little care a grand job can be done, and the end result will be better than the original.

While the fan is out it's a good idea to blow the dirt out of the condenser vanes. A blow-gun connected to an air line can be used to great effect, but there's a high risk of bending the vanes, which will then have to be straightened with tweezers! The 'blow' end of a vacuum cleaner will do an adequate job, but the best tool is a hand-held centrifugal blower (this is really just a vacuum-cleaner motor in a more convenient form, with a nozzle).

Compressor problems

Compressor problems are usually of the failure-to-start variety – some makes seem to be prone to sticking after a long period of inactivity. If this fault is noticed as soon as the machine is tried there will be little harm. But dozens, or more likely hundreds, of operations of the excess-current protector will damage this item, which will have to be replaced. If a compressor is stuck it can usually be freed by striking the 'pot' smartly with a mallet. Time is of the essence here, because the pot has to be struck before the excess-current trip cuts off the power. Another method apparently is to use a capacitor in the feed to the start winding. This makes the motor run backwards. I've not tried this myself, but it is claimed that compressors can sometimes be freed by driving the motor backwards and forwards alternately.

While there have apparently been one or two fridge motors that are DC electronically-commutated designs (for use on yachts), induction motors are used in virtually all compressors. Unfortunately it's not possible to have a centrifugal switch to disconnect the start-up winding, because switch arcing would decompose the refrigerant inside the pot. So how is the start-up winding switched in and out of circuit you may ask? The answer is to use a current relay. Fig. 1 shows the basic compressor motor wiring. When the current is high, as at switch on, the relay contacts close, connecting the start-up winding. Once the motor is up to speed, the start-up winding is disconnected. These little relays resemble a black plastic cube, with connection sockets. They plug directly on to the pins that protrude from the pot. Note that they are matched to the motor. But there is some standardisation (not a lot!).

Another mystery item in the compressor is the excess-current protection device. Early types consisted of a bimetallic strip with a heater. The start and run current flows through the heater and, if excessive, the bimetal strip heats, bends and opens a pair of contacts to stop the current. It's now possible to get solid-state protectors, which are said to be more reliable. What is a near certainty is that if a machine with a stuck compressor has been trying to start for a day or so the protector will be ruined, or at least no longer reliable, and will have to be replaced.

The humidistat

The last of the easily replaceable items is the humidistat, though not all machines have one. In my opinion a humidistat is a must, because it enables a machine to be left powered and ready to act against dampness. The humidistat is simply a length of plastic film that contracts when dry and extends when damp, operating a microswitch.

Sometimes the humidistat loses its calibration and has to be retensioned using the adjustment screw (not the control knob). This is an easy job when another machine is available for comparison.

Major work

More serious faults, such as a faulty compressor or lost refrigerant, will probably mean that the machine is scrap. It's feasible to replace the compressor (perhaps with one from the fridge and deep-freeze mountain?), but the ability to silver-solder is required. It really calls for oxyacetylene equipment, also a decent vacuum pump and a supply of compatible refrigerant. Obtaining small quantities of refrigerant in this country is difficult. Canisters of R12 used to be cheap and readily available in the US, so that Americans could recharge their automobile air conditioners at home, but the supply of industrial gases in the UK seems to be in the hands of those who make things completely uneconomic for the small user.

Desperados may try propane, but its effect on the motor windings is uncertain. Some manufacturers have used propane as the refrigerant in portable domestic air conditions however. There are possibilities, as propane is a member of the alkane or paraffin family (paraffin means with little affinity) and is not particularly reactive, but it's inflammable.

The vacuum pump is needed to remove air from the system before introducing refrigerant, as any air left in the system makes the compressor perform useless work. A very good vacuum pump is required when expensive refrigerants such as helium are being used, because it's highly desirable to do the job in one hit. With cheap refrigerants such as propane the system can be evacuated and filled several times to remove the air, so a less exotic vacuum pump can be used.

Note that no responsibility can be taken for experimentation with different refrigerants etc. Especially note that butane is totally useless as, when subjected to atmospheric pressure, it is a liquid at 0° Celsius.

Further reading

Refrigeration and Air Conditioning by A.R. Trott is quite an interesting book. This weighty tome is mainly about heavy-duty industrial plant however, and 'sealed-unit' refrigeration is not covered in any depth.

A final point

Finally, if you should come across a dehumidifer with a stuck fan at the recycling centre, the gamble of a few pounds will usually be most worthwhile.

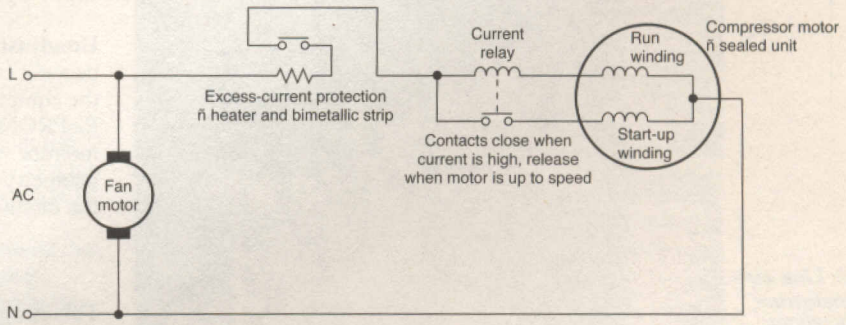
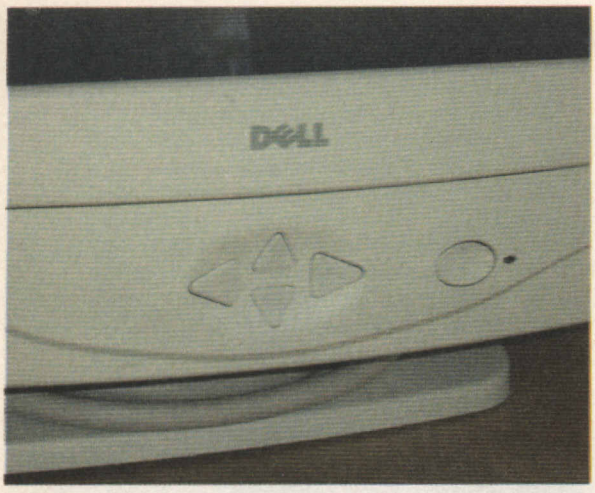


Fig. 1: The compressor and fan motor wiring. The few items shown here are responsible for most problems. There's a lot more to the machine of course, in particular the humidistat, the tank-full switch and the process timer.



Servicing Nokia monitors

Photo 4: Front panel, Dell model D1025HE.

In this concluding instalment Donald M. Henry provides fault-finding guidance for Models 445R061 and 447S061

The first instalment in this two-part article, last month, covered Models 44BN, 449E461 and 447W063. This concluding article covers Models 445R061 and 447S061. As previously mentioned Nokia, an original equipment manufacturer, supplied its monitors to various PC manufacturers and retailers. So they turn up with various badges on them, particularly Dell.

Model 445R061

This 21in. monitor appeared as the Dell Model D2128-TCO, the Dell stock number being 99048. It deserves a 'get assistance' label – the weight of some 21in. monitors can shock experienced TV engineers who are used to lifting TV sets with much larger screens. Perhaps the CRT glass is thicker than that used with a picture tube: certainly the length of the narrow-angle tube means that one's arms have to carry weight at a greater distance forwards from the shoulders. So get help and save yourself an injury.

Once you are inside the beast a total of 51 screws have to be removed to extract the chassis and gain access to the solder side of the main PCB! Why? The design, with its DPMS (display power management system), may claim to be a "pollution preventer" but is the cause of a great deal of hot-air huffing and puffing once it's on the bench. And all monitors have to be scrapped eventually, i.e. dismantled. Many designers just don't take servicing into consideration. Anyway, these are the problems I've had with this model.

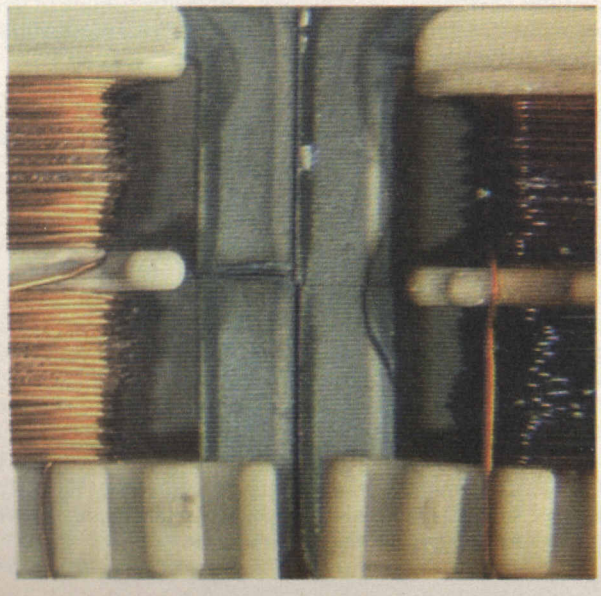


Photo 5: Line output transformer (Eldor FJ3000) windings, Model 447S061.

Dead but the green light operated: There was no EHT because T405 (IRFS9620) and T407 (BUH1215) were short-circuit, DZ401 (ZPD12V) was leaky and R411 (0·47Ω) was open-circuit. Once these items had been replaced the monitor ran on test. But our scrupulous quality-control department rejected it because of intermittent line tear, describing this as "line slightly fuzzy".

So all 51 screws had to be removed again. I then began the tedious task of lifting the wire jumper leads that, as mentioned with the previously described 17in. model, can cause weird intermittent faults. While I was thus engaged the BUH1215 transistor failed again, possibly because of movement. But when it failed I noticed a puff of smoke from the vicinity of L402. When I removed it and peeled back the black rubber cover on the transformer's winding I discovered the original cause of the trouble: use of a powerful magnifying glass revealed a burn-arc where the primary-secondary tail wires cross rather too close together. A substitute from a scrap unit was found and fitted then, after another soak test, our beady-eyed QC man agreed to pass it.

Unadjustable brightness: The EEPROM's contents had become corrupted. As mentioned before we don't have the equipment required to reprogram/adjust the EEPROM. However a replacement from a scrapped monitor with a smashed tube produced a grey-scale and geometry that were close enough to my eye. Otherwise the monitor would have probably been scrapped.

Model 447S061

This is my favourite Nokia monitor. I wish they'd started off with it and forgotten all the rest! The Dell model number is D1025HE, 1000HS series, part numbers 50293 and 66052 (Photo 4 shows the front panel). The monitor is fitted with a 17in. Sony M41LKN15X Trinitron tube. The quality of the display is excellent (LM1283N video preamplifier chip this time) and you get as large a

diagonal as possible through the 15·6in. bezel aperture. Desktop footprint is the neatest I've seen, and the arrow-button controls are easy to understand. These were amongst the last units that Nokia produced and are popular, so they continue to get good prices.

Access

The only complaint I have with the designers this time is the difficult back-removal procedure. Sadly this results in the odd casualty where a user has tried to gain access using the tin-opener technique. Once you have removed the swivel base and the two screws on the underside, look for four small slots (two each side) at the sides of the bezel. Insert a small, flat-bladed screwdriver in each slot in turn: each will require a sharp 'knock' to release the catch. It is easiest to work on one side first then the other. Next, remove the aluminium shield – you require a Torx screwdriver for this.

The EHT transformer (with integral focus/A1 block) is bolted to the side of the chassis. This prevents cracks in the main PCB. Good thinking!

Fault conditions

Green LED lit and degaussing clunk, otherwise dead: This is typical of line output transistor, FET and feed resistor failure. But you should also be suspicious of the line output transformer, which has nothing to do with the EHT. Remove it and examine it carefully. Photo 5 shows the windings. If they are dark or tiny bubbles can be seen on the varnish, a new one is required. In view of the price of the line output transistor it is not worth trying a new one without checking the transformer, as there's no mercy or time to switch off before everything fails again.

The usual parts list for this repair is T407 (BUH1215), T405 (IRFI9620G), R411 (0·47Ω) and M404 (Eldor transformer type FJ3000). Finally, remember to check DZ401 (10V zener diode) which may be short-circuit. Photo 6 shows the layout.

The symptom can also be caused by failure of one of the Wickman fuses F102 and F103 on the secondary side of the power supply. Check these when the line output stage is OK. See warning in the following fault note.

Dead – you might see a flashing green LED some moments after unplugging the monitor or pressing the power button: This is usually caused by a short-circuit on the secondary side of the power supply. You will probably need to remove the plastic cover on the underside of the chassis – the one that hides the 'live' side of the supply. Don't say I didn't warn you: discharge the mains bridge rectifier's reservoir capacitor (it's had a go at me on occasions!). The usual offenders are rectifiers D126 and D127, which can go short-circuit.

Difficult on/off switching: The complaint was "won't switch on". Yet it started without trouble on the bench. Then it wouldn't switch off. It tried to go off, but immediately came back on. I was about to condemn the EEPROM or microcontroller chip but a further furious tap on the button switched the monitor off. Then it wouldn't come back on again.

Diode and continuity-beep tests with a meter proved that the contacts were OK. But it's a momentary-contact action. I noticed that the front-control panel arrow-buttons under the rubber membrane use exactly the same momentary-contact switches, so I swapped one of the arrow switches with the power on/off switch. After that the monitor could be turned on and off without the aid of a screwdriver to belt the switch, and the arrow-button didn't care about the lazy replacement.

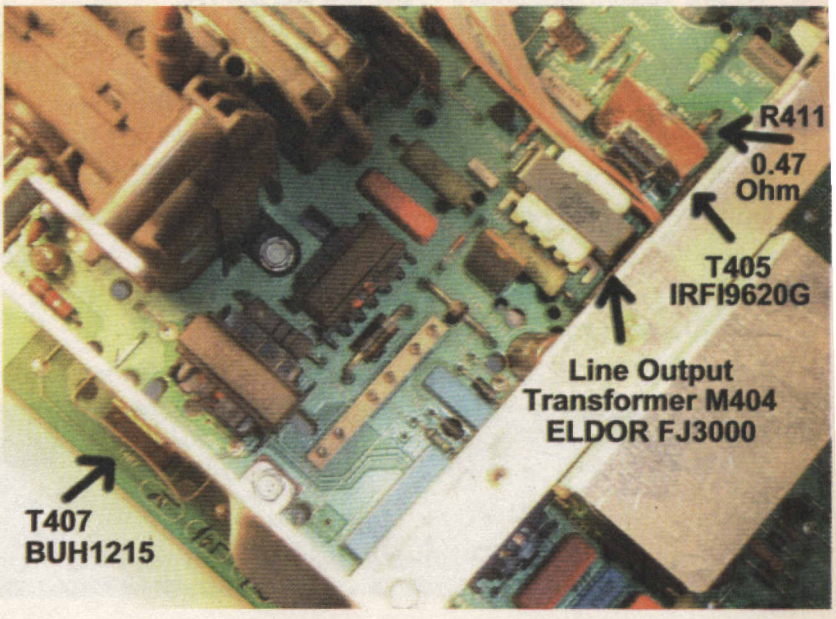


Photo 6: Line output stage layout, Model 447S061 (Dell D1025HE).

I can only guess that the transient-action speed is critical to the power on/off circuit. I then found that there were four more monitors waiting with exactly the same fault. Must have been a batch problem.

Frame flickers: This symptom is often the result of dry-joint trouble around the STV9379 frame output chip IC203. When the chassis is upside down you could be forgiven for thinking that IC402 (SLA5038), a large SIP package, might be the frame output IC. This is actually the line-frequency S-cap selector, which is used instead of individual FETs. It's controlled by the microcontroller chip and I've never known it be the cause of any trouble. The frame generator is in the TDA9105 chip IC201. This has proved to be very reliable.

Apart from a few other dry-joint areas in the usual hot spots – around transformers and power devices – the main PCB chassis is amongst the best I've come across for reliability.

One colour missing: Scope checks around the LM1283N video preamplifier chip IC1 on the CRT PCB showed that it was working correctly, with all outputs present. Each channel then passes to the CVA4401N chip IC2, which is hidden under the heatsink for the CR6727A green output IC. IC2 was the cause of the fault. It seems to be some kind of buffer or switch for the three RGB channels, but without a circuit diagram it's not possible to be sure about the functions carried out by this chip.

Green content missing in the display: It is common to find a howler of a dry-joint on the video PCB, at the CRT connector. It's accessible through the crescent-shaped aperture at the rear of the screening can, so you don't need to remove the can. Simply place the monitor face down on the bench to reduce the risk of solder dribbling down the board inside the can. Strangely, I've never found dry-joints anywhere else on this board.

In conclusion

A final note. Nokia monitors generally produce excellent displays. Some are really superior. Pick your monitor carefully if buying second-hand and, if you get the chance of buying failed stock from any of the 'recycling' houses, balance the cost against your repair time. ■

Memoirs of a cable technician

Mike Rutherford reflects on a life spent largely in the cable TV industry, from the primitive distribution systems in the early Fifties to today's advanced technology. With some interesting stories along the way

Distribution of broadcast entertainment via cable began in the Twenties in Hastings, with a single radio station – the BBC National Programme. Listening to the radio was expensive in those days. 'All-mains' receivers were scarce, the majority of sets being powered by zinc-carbon batteries or a lead-acid accumulator. The latter could be charged at the local radio shop, bicycle shop or hardware store. You had to own two, so that one could be charged while the other was in use.

Use of the radio as a 'musical wallpaper' background was prohibitively expensive: the HT battery cost almost half a week's wages for the average man.

With wireless relay however one could listen to the radio all day, every day for a weekly charge of 1/6d (7·5p), which was good value for the housebound housewives of the time. The relay had another advantage: it provided clear, static-free listening.

Growth of services

As the number of radio services grew, so did the number of copper pairs needed to carry them. With the advent of TV, wireless relay engineers had to find a way of distributing both sound and vision signals on their networks. The solution adopted was, in principle, very similar to today's ADSL service from BT. An HF carrier at about 3·5MHz was used for the vision signal, with the sound going at baseband over the same copper pair. A dedicated receiver was required to accept and select the signals. It was available on rental from the relay company that provided the service.

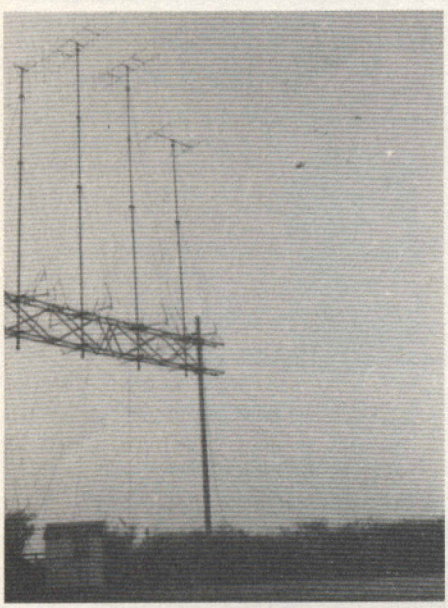


Photo 1 (left): The head-end aerials for the Haverfordwest network in the early Sixties.

As the number of TV channels multiplied, so did the need for pairs to carry them. Soon the HF relay networks that served many major cities became too expensive to operate and maintain. In addition they couldn't compete with the coaxial broadband networks that were springing up. The coaxial services could be used with off-the-shelf TV and FM receivers, giving the customer a wider choice, and adding extra programmes was not difficult.

A start in cable distribution

This is where I began my new life after National Service, complete with the luxury of allowing my hair to grow longer than half an inch! My new employer operated mainly in South West England, though the City of Oxford was at one time blessed with one of our networks.

As an introduction to the technology I was sent to the factory, in a small East Devon village. It had moved from the manufacture of projection TV receivers to signal-level meters and network hardware, including amplifiers, head-end converters, splitters, tee units and subscriber taps.

The village where the factory was situated also served as a test-bed for the company's products. The equipment at the aerial site was housed in an old taxi cab: mains electricity was fed to the site via an isolation transformer and the coaxial cable that brought us the Band I signals. It sounds dangerous, but the cable used was fairly hefty and could probably withstand four or five thousand volts between the inner conductor and the screen.

At the factory the signals were levelled then fed out along the road that comprised the village. The cable was tacked to the eaves of buildings in the village square, but farther afield it was strung along hedge bottoms, run in culverts, along fences and walls, and was terminated at the pub that was the last building along the road.

The valve repeater amplifiers that were used were powered by a 65V AC supply, which was fed via the coaxial cable. They covered 40-70MHz, and had a sloped response to compensate for the sloped attenuation introduced by the cable. A mid-stage coil adjusted the slope, in the hope of maintaining equality of signal levels over a cascade of six or eight repeater amplifiers. Splitters, taps and tee units were resistive. A two-way splitter would lose 6dB and was made up of three star-connected 22Ω resistors. Tee units consisted of one resistor, of appropriate value, that teed from the main line to feed a spur line. Subscriber taps were similar, and no attempt at back-matching was made. The spur or the subscriber feed was from nothing less than 235Ω!

Local conditions

The network broke down continually but the villagers, who had the service free, rarely complained. The local geography effectively blocked the ch. 2 BBC signals from North Hessary Tor, and ITV was available only from the Chillerton Down transmitter on the Isle of Wight, a long way off. So the 'pipe' was the only way they could get TV. It also avoided the need for large aerial arrays on the chimney-stacks of a very pretty village.

A head-end at Newquay

After initiation into the ways of VHF CATV I was released into the field to exercise my talents at various developments in the South West and West Midlands. I also acted as a trouble-shooter. I spent three glorious summer months installing a head-end at Newquay in Cornwall. The local engineer was another Goon fan, which helped a lot. We found excellent ch. 8 ITA signals from the

Midlands up on Davidstowe Moor, and applied for permission to bring them to Newquay via a microwave link. This was refused on the grounds that we would be extending the service area of the Lichfield Midlands transmitter, which was not permitted under the rules governing CATV programme delivery at the time. With the head-end up and running and the first subscriber connected, my job was over. I went to Haverfordwest in Pembrokeshire to troubleshoot a cable system with radiation and other problems.

Saga of the Haverfordwest network

The Haverfordwest system was operated by two dealers in the town and an accountancy firm. It was designed by a consultant who greeted me with suspicion, justly so. As I probed deeper into the operation of this network I discovered that the 'consultant' was also employing a small band of youths in an empty house in one of the town's back streets to make tee units, splitters and tap-off boxes. He sold these to the relay company. The house, which belonged to the company, was also the distribution centre for the network, having a clear cable run from the head-end. The latter was in a field above the town, with aerial masts that were reminiscent of a fully-rigged sailing ship (see Photos 1 and 2). As the equipment here was functioning properly I left it largely alone – it was housed in a wooden hut.

Radiation from the network was above the legal limit, and the network was under sentence from the Home Office, which regulated such things at the time (in the early Sixties). I soon found the reason for the radiation. The boxes that contained the splitters, taps and tee units made by the local youths had been put together with the lid isolated from the base by a rubber sheet. The amount of unscreened circuitry inside each box was considerable, so the signals were being picked up by the lids and rebroadcast free over a large area of the town and a neighbouring council estate. As the BBC and ITA signals were relayed at their incoming frequencies, they produced ghosting with receivers fed from aerials. Every box had to be opened and a copper-foil rectangle inserted to make solid contact with the base, leaving the rubber in place above it to provide a good pressure contact for the two sections of the box. This worked, and the network was reprieved.

During this time the consultant, who had a room over the shop of one of the dealers, succumbed to influenza. As his condition worsened, it became necessary to move him to the local cottage hospital. I had plans to redesign part of the network in his absence, to make it simpler and more reliable, and needed access to maps of the cable route. One of the partners believed that the maps would be in the consultant's desk, and we went together to look for them.

I looked along the shelves while he looked in the drawers of the desk. A few seconds later he uttered a cry of disbelief and called me over. Several school exercise books contained lurid pornographic stories written in the consultant's own longhand, accompanied by sketches that would stretch the imagination of simple folk like TV dealers and CATV trouble-shooters. The dealer was a devout Christian and was appalled. This led to the consultant's dismissal.

While working on this network I had enjoyed the company of Billy, the installation team supervisor. When everyone was satisfied that the network was stable and, more importantly, legal, I moved on to my next assignment and left Billy in charge.

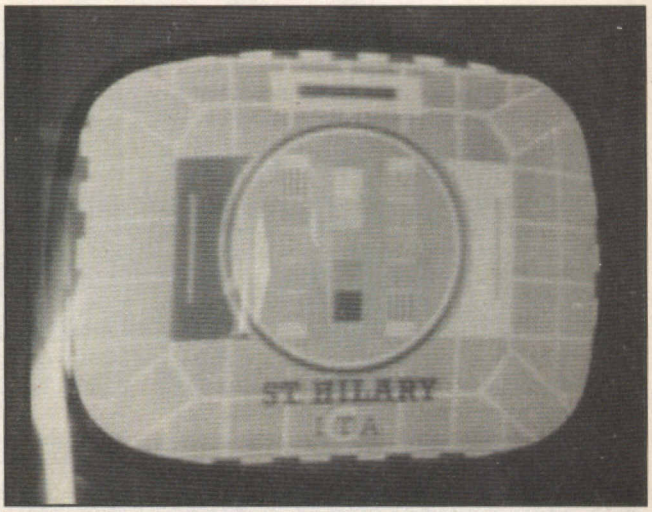


Photo 2: Reception from the St. Hilary ITA transmitter at the Haverfordwest network's head-end – in that wooden hut!

Oxford

This took me to Oxford, where the company had a large network under construction. This was serious stuff, and a well-appointed office was put at my disposal. The planning office was massive, and several wiring teams came and went incessantly with drums of cable and other equipment. The "City of Dreaming Spires" was a benign place to work in during the Sixties, and my time there as deputy to the Chief Engineer was a pleasant one.
Unfortunately I was out night after night with the breakdown teams, looking into customer complaints and logging them for future reference.

The problem at Oxford was that too many amplifiers were cascaded. The accumulation of noise and distortion had become so large that there was little or no headroom for transmission-level variations. In other words, the dynamic range of parts of the network was low. Nobody knew about reach diagrams then, but we learnt quickly enough.

Back to Devon

The Devon village where it all began seemed far away. But ominous reports reached me about the financial state of the company, and there were sackings (no redundancies then). Next the bank foreclosed on the manufacturing company's debt. As my favourite girl still worked in Devon, I made contact with her. She seemed to welcome the approach, so off I went. We married shortly after, and have been for over forty years. Married life took me to Brixham and work with Brixham Relay.

The aerial site was at Berry Hill, and a trunk line fed the town. I ran this network virtually single-handed for a time. Part of the network would always fail on Friday night, at about 10.30 p.m. The cause was always the same: someone reached up to an amplifier and disconnected the input cable. One night I positioned myself not far from the amplifier, concealed in a doorway, and waited. At 10.30 p.m. the pubs emptied and an inebriated figure staggered up to the amplifier and removed the input cable. He was a local businessman, and was warned off.

Subsequently the company that ran the Brixham Relay began to lose money. I was faced with losing my vehicle and having to service the network on bicycle. It seemed time to make another move, and I walked straight into another job.

I was now employed by a company in the Telefusion group, working on networks in the Torquay area. Band III was being considered for cable, but was yet to be used. It was however being used with communal aerial installations at blocks of flats and caravan parks, of which there are many in the South West. CATV required better performance over a wider bandwidth, which was not available with the valve equipment we were using at the time.

The Torquay network worked well, with very little trouble, and stood up to the sea breezes, quite harsh winters and hot summers. I was beginning to feel the need for another change and, through the kindness of the General Manager at Telefusion in Torquay, was found a job in Essex, at the old Teleng factory in Harold Wood.

Manufacturing – and transistors!

Teleng was the equipment design and manufacturing arm of Telefusion, and I spent five years there. This was during the changeover from valve to solid-state technology, and at times the transition was painful. Initially all HF devices were ger-

manium, very fragile and rather expensive. One day in the laboratory an engineer was tweaking a distributed amplifier that used six Motorola germanium RF power transistors. "Oops" he cried as the six transistors, priced at £11 each, became short-circuits.

The problems of maintaining a flat frequency response and compensating for the effects of temperature on the cables were exercising our minds. At that time all cabling was overhead: digging up the streets was out of the question. Cable attenuation was affected by temperature, and some means of controlling the flatness of a network and the signal transmission levels was required before larger networks could be contemplated. The ALC amplifier project with which I was involved took up hours of development time. In the end a workable system was achieved, using a gain-controlled amplifier with a pin-diode attenuator and with some slope equalisation included. Use of two pilot carriers was proposed, at 40MHz and 230MHz. These would provide a direct indication of the overall level and change of slope in the network. Changes could be deduced by analogue means and compensation applied to restore the correct transmission levels. We were still using valves then, albeit Mullard SQ ones like the E84F.

I produced many designs for passive devices such as directional couplers, splitters and subscriber taps, and also some low-noise masthead VHF channel amplifiers. Colour came, and the laboratory was endowed with a 21in. GEC shadowmask CTV in a huge metal cabinet. It used to disappear at weekends, to the home of one or another member of senior management, and would reappear on Monday morning. It got more use that way than in the lab, where it was zealously guarded by the development manager. We might be good RF engineers, but we were not trusted with colour TV!

UHF was not thought to be viable for CATV by the Teleng management, so ch. 33 was converted down to VHF for distribution via cable. Cable TV was in calm waters, not going anywhere. After spending five years at Teleng I left, poached by the mighty Thorn empire – before I could see the ALC project reach completion. Anyway the pay was better.

Work at Thorn

The Thorn Electronics "Wired TV" laboratory at Enfield was a fun pace to work and, because of this, we all worked harder than normal. Soon after I joined Thorn, the lab and repair department was moved to Nottingham, where it lasted for five years. I was happy to move there, along with three others.

During my time at the laboratory we won a contract to supply the equipment for a CATV network in Brussels, in the Ixelles district. The aerial site was on a high building that was occupied by Assurance Generale. Prior to gaining this contract we had dealt with many lightning problems and had been successful in overcoming all the induced-EMF effects, but were left with the direct-strike problem. One night a huge thunderstorm broke over Brussels and the AG building received a direct strike. This wrote off the taxi service's transmitter, but the CATV network survived – despite a 10mm diameter hole that appeared in the case of a 12V power supply.

The Nottingham Wired Television lab was a powerhouse of original invention, and lacked only the funds to create really great equipment. Thorn had originated CATV amplifiers with push-pull output stages. This arrangement provided greater output capability with lower harmonic distortion, and was eventually taken up by all CATV amplifier manufacturers.

UHF distribution was now being considered for communal aerial systems, and the favourite transistors of the day were the BFY90 and BFW16. One of my last tasks was to design a broadband UHF amplifier using these transistors – and to give a talk to the Society of Relay Engineers, now the Society of Cable Telecommunication Engineers, on UHF distribution. Work on ultra-wideband network hardware followed, much of which was done with fibreglass PCBs that were hated by production because they soon blunted drills and cutting tools. Nevertheless we produced one of the first UHF distribution systems in the UK.

A stint at Belling & Lee

Our enthusiasm was not enough to ensure continuation of the operation however, and the division was eventually sold to EMI at Hayes. I was interviewed for work there but took another job, as laboratory manager at Belling & Lee in Enfield. The company had diversified, but this was found to be a mixed blessing. So non-CATV/MATV work was cancelled. My days at B&L were fraught because of money problems with management. Requests to purchase essential equipment were continually vetoed by my superiors. There were other problems: few people realised then, and even now, that this technology is cutting-edge stuff.

Then there was the saga of the world's only masthead amplifier for ch. 33, the Star. It used a single grounded-base amplifier stage and provided a gain of about 6dB. But if it was powered before the aerial was connected it would oscillate merrily and produce patterning on neighbouring receivers tuned to BBC2 London. It fell to me to modify the amplifier to make it stable, which I did at minimal cost. The entire stock was reworked and sold off.

My stay at Belling & Lee lasted for eighteen months, after which I left the CATV industry for nearly twenty years.

The CE industry

I returned to Thorn, this time to the consumer electronics side, which was then known as the British Radio Corporation. It was subsequently renamed Thorn Consumer Electronics, then Thorn-EMI, and was finally sold to Thomson of France.

Occasionally, as a TLO, I would have to investigate a problem associated with a Ferguson receiver used with a cable network. This would occur when there was a dispute between a dealer who sold a Ferguson TV set and a cable TV company. One memorable problem was caused by a viewer who had combined his cable TV, aerials, satellite receiver input and the output from a security camera modulator. I did sort it out, but it was a headache and strictly speaking outside our obligations. Goodwill was considered to be important however.

In the spring of 1994 I was approached by Pace Micro Technology, which was making analogue satellite set-top boxes and, with the arrival of digital TV, planned to enter the CATV set-top box market. Whilst at Pace I gave a series of lectures on digital TV around the UK, with the late Peter Kennaugh as my colleague. Then Pace went public and subsequently fell on hard times. A long, hard look was taken at costs, and you can guess what happened. Redundancy raised its disagreeable head, and my days of working for the big companies were over.

Progress

CATV has come a very long way since those crude but earnest attempts to bring TV to a Devonshire village in the late Fifties. From unidirectional systems using Band I only (40-70MHz) the bandwidth has ballooned. Coaxial networks are now bidirectional, with the forward path spanning 80-860MHz and the return path spanning 5-65MHz. Fibre-optic networks have an enormous bandwidth, possibly more than we shall ever need.

Current talk is of fibre connections to domestic property, ousting copper cables entirely. This is too expensive at present, though some successful experiments have been conducted in Europe. The cost of an optical receiver is not excessive, but a laser transmitter is required to operate the return path, and the cost of these is high. As so often however mass production might make it all possible. We shall see!



Much vintage equipment, particularly in the hi-fi field, is of very high build quality. It can therefore continue to provide good service for years, with only the occasional need for repair. But many modern technicians are probably not too sure how to go about it when valves are involved. Pete Roberts tackles a Radford STA25 valve hi-fi amplifier

Photo 1: Top view of the Radford STA25 hi-fi amplifier, with the screening cover removed.

EL34s and all that

This job should bring a tear to many eyes. None of your cheap, flimsy surface-mounted nastiness here. Oh no! A proper piece of kit, built on a heavy metal chassis, with big parts and enough volts to fry the unwary. The fault report that came with this Radford STA25 stereo amplifier said "one channel bad".

Basic circuit arrangements

The power amplifier has a matching preamplifier, which was the usual practice in those days. The power stereo amplifier has, in each channel, an EF86 low-noise voltage amplifier valve, an ECF82 phase splitter, and a pair of EL34 output valves connected in an ultra-linear configuration. What this means is that the screen grids are fed from taps on the primary winding of the output transformer, a sort of compromise between triode and pentode operation. And no, ECF82 is not a misprint: Radford designs used an unusual triode-pentode balanced phase-splitter, so don't insert an ECC83 in its place!

The valves are arranged at each side of a large screening cover that encloses the mains and output transformers, the reservoir capacitors and the smoothing choke, see Photo 1. The power amplifier is connected to the preamplifier via an umbilical cable with international octal plugs at each end. This carries the HT and heater supplies, also the mains live connection to and from the on/off switch. So you need the preamplifier and cable in order to switch the thing on. The audio cables are separate, and use RCA plugs.

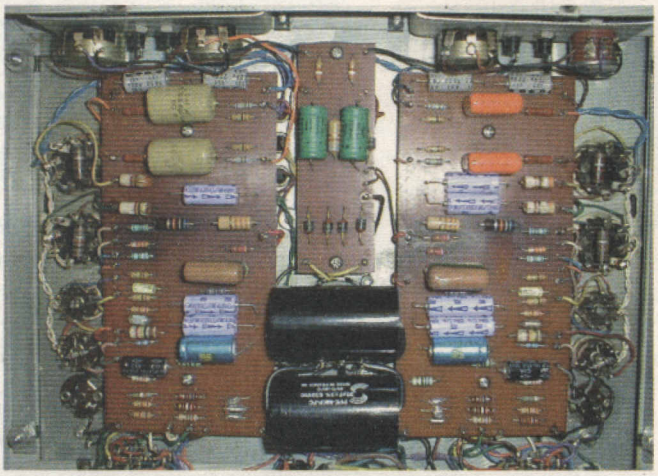


Photo 2: Layout under the chassis. There are three PCBs, one each for the right and left channels and a small one (centre) for the silicon HT rectifiers and the bias supply components.

Testing

After risking a hernia lifting the amplifier on to my bench I plugged it in, stood well back, and switched on. It wasn't long before one EL34 started to glow cherry red. Yes, I know they are meant to – but only the bit in the middle! This valve's anode was glowing hot enough to make toast. Not a good state of affairs. Furthermore the strong smell of a carbon-composition resistor gently roasting, accompanied by a wisp of smoke, indicated that all was not well underneath the chassis. It took me back to my teenage years!

When the amplifier is upside down on the bench and the baseplate has been removed you see the fascinating arrangement shown in Photo 2. Most of the circuitry is mounted on two heavy PCBs, one for each channel. The small upper centre PCB carries the HT rectifier diodes and the bias supply. The upper right-hand section shown in the photo was the bad bit – the photograph was taken after the fault had been cleared.

The usual cause of a hot and bothered output valve is a leaky control-grid cou-

pling capacitor. So I checked the voltage at each of the EL34 control grids. In this version of the STA25 a –35V fixed bias is obtained from a winding on the mains transformer, via a half-wave rectifier. The checks showed that the correct voltage was present at three of the valves, while the distressed one had several hundred volts at its control grid when cold, dropping to 17V when hot.

I realised what was happening only after a certain amount of head-scratching. I hadn't noticed, with the digital meter I was using, that the minus sign was missing: the grid was being driven hard positive. Had I been using a more appropriate instrument for the job – my old-fashioned analogue meter – I would have noticed straight away that there was a positive voltage at the control grid. The 0·47μF, 400V grid coupling capacitor was dead short. It's one of those big, fawn fellows on the left-hand side PCB. These old Philips polyester capacitors are usually extremely reliable, so what had led to this one's failure?

Fault analysis

Previous repairwork had been carried out – a nice job, with many new parts tidily mounted. The circuit diagram shows 400V coupling capacitors, and the repairer had fitted 400V replacements. And here was the rub. Most Radford amplifiers have a valve HT rectifier and use cathode bias for the output valves. The one that sat in front of me had silicon HT rectifiers and used fixed bias that's fed to the control grids. Because of the silicon rectifiers, the HT comes up straight away at switch on. It peaks at about 500V with no load, before the valves warm up. Initially the phase-splitter valve is cold, so there's no current via and voltage drop across its anode load resistors. Thus the 400V coupling capacitors initially have about 500V at one side and –35V at the other. This state of affairs lasts for the better part of a minute, until the EL34 valves have heated up and the HT supply is properly loaded. No wonder one of the 400V coupling capacitors had failed. I thought it advisable to replace all four with 630V polyester capacitors – the type shown at the top right (red blobs) in Photo 2. This cured the overheating and restored correct operation.

The distressed EL34's screen-grid feed resistor had been the source of the smoke. In the interests of reliability, as well as making the job look nice, I replaced all four screen-grid feed resistors using a 1kΩ, 3W flameproof metal-film type.

I was surprised that the overrun EL34 had survived all this abuse. Once its grid-coupling capacitor had been replaced the grid bias was rock-steady at –35V, so there was no grid-current flow, and the audio quality was excellent. The EL34 is a really tough bottle. I've seen examples, from high-power guitar amplifiers, where the bias supply has failed and the glass envelope has melted, yet the user has managed to finish the gig.

Bias adjustment

This particular model has a facility for setting the bias for the output valves, see Photo 3. All you have to do is to connect an accurate meter (a DVM is best for this job) between a test point and chassis, then adjust the accompanying potentiometer for a reading of exactly 2V. This procedure has to be carried out for all four valves, with the amplifier fully warmed up. The grid-bias reservoir capacitors, dated 1966, were obviously the originals, so I replaced them with new long-life ones – good for another forty years perhaps!

There was a limited edition version of the STA25, made with a special finish and circuit: I suspect that this particular amplifier may have been one of them, which would explain the circuit differences.

HT surge

There's a moral to this tale. When servicing valve gear with solid-state rectifiers, be aware that the HT supply could be up to 40 per cent higher than normal until the valves have heated up. The capacitors must be rated accordingly. This amplifier's HT settled at about 370V once the valves had warmed up.

Back in the 'golden' days you would find electrolytics marked something like "275V DC wkg, 350V DC surge". They were designed to withstand substantial over voltage for a short time. You would find them in TV sets that were fitted with a selenium HT rectifier rather than the ubiquitous PY33.

The smoothing capacitors in this amplifier had been replaced with the largest polyester-film capacitors I've ever seen, 20μF at 630V! See Photo 4.

Precautions

Finally, while old-hands are aware of the hazards associated with valve gear younger readers may not be. As well as the usual risk presented by the 230V mains supply, the HT line in hi-fi and guitar amplifiers can be at 1kV or even higher. Where a bi-phase valve rectifier is employed, the mains transformer's centre-tapped secondary winding will be running at not far off twice the rectified HT voltage, with enough current to kill you. A few tens of microfarads charged to several hundred volts pack one hell of a punch, and smoothing capacitors can hold a lethal charge for hours. Always ensure that they are fully discharged before you touch any part of the circuit.



Photo 3: The grid bias adjustment test points/potentiometers.



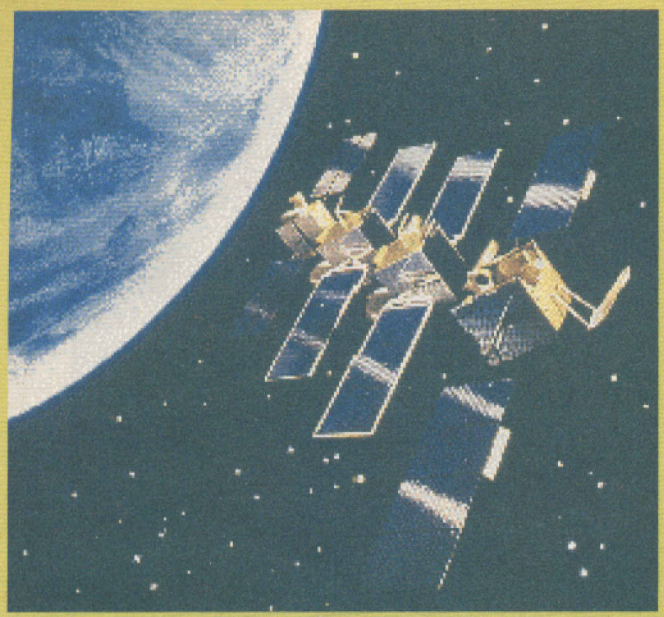
Photo 4: The replacement polyester-film HT smoothing electrolytics.

High-voltage electrolytics are grenades waiting to go off. So never hang over the cans in powered equipment. I know of a couple of cases where large electrolytics have blown out their bungs and taken off like rockets – through both ceiling and roof!

Never trust the mains switch – always isolate it from the mains supply before carrying out repairs. When working on preamplifier and power amplifier separates, make sure that umbilical cables are correctly connected before applying mains power.

Test probes should be rated for use with high-energy circuits, and preferably fused. When carrying out 'hot' measurements, keep one hand in your pocket.

And never run a valve amplifier without a load, otherwise the high back-EMFs that will be developed across the output transformer's primary winding could cause serious damage to the transformer and flashovers in the output valves. ■



DX and Satellite Reception

Terrestrial DX and satellite TV reception reports. Broadcast and satellite TV news. Amateur TV adopts digital technology. Roger Bunney reports



Christian Maas (Dr Dish) left and son right, received in SE England via the Intelsat 707 (1°W) Scandinavian beam.

The good news is that there has been a lot of Sporadic E reception, even better that TVE (Spain) is still using Band I! The SpE season started towards the end of April, fizzled out somewhat during early May then opened up again towards the end of the month. The very strong ch. E2 TVE signals from Madrid during the evening of May 26 resembled the conditions we experienced in the mid-Sixties. Hugh Cocks (Algarve) confirms that TVE ch. E3 Izana (Canary Is) and at least one ch. E4 transmitter are still on-air, also all the RTP (Portugal) Band I transmitters.

The May Band I SpE log is as follows. Reception from the south and south-east has predominated so far this year,

6/5/03 RAI (Italy) chs. IA, B; Tele-A (Italy) ch. E2–; TVE (Spain) ch. E2; Canal + (France) ch. L2.
7/5/03 RAI IA; Tele-A E2–; ARD (Grunten, Germany) E2; LTV (Latvia) R2.
9/5/03 RTP (Portugal) E2.
13/5/03 MTV (Hungary) R1; RTL (Hungary) R2; ORT (Russia) R1; TVR (Rumania) R2, 3; RAI IA; SLO (Slovenia) E3; HRT (Croatia) E4.
17/5/03 RAI IA; Tele-A E2–; MTV R1; ARD E2; YT-1 (Ukraine) R1.
19/5/03 RAI IA; YT-1 R1; ETV (Estonia) R1; RTP E3; TVE E2, 4; ARD E2.
20/5/03 YLE (Finland) E3; NRK (Norway) E2; TVE E2, 3; ETV R1; unidentified ch. E2 signal at 2015.
26/5/03 HRT E4; RTS (Serbia) E3; TVE E2.
28/5/03 TVE E3.

Garry Smith (HS Publications) tells me that the D100 TV-DX tuner continues in production. This is a full-specification tuner with variable bandwidth, VHF/UHF coverage, audio subcarrier tuning, UHF output etc. In addition a simpler, less expensive tuner, Model D500, is to be introduced. This will have vision only output and coverage of 45-90MHz, i.e. NZ ch. 1 to ch. R4. It's intended for SpE DXing, with simple operation using tune, gain and bandwidth controls. I'll review it shortly. For further information on these tuners send a stamped, addressed envelope to HS Publications, 7 Epping Close, Derby, DE22 4HR (phone 01322 381 699).

Satellite sightings

A Viva La Cinema caption was seen via an NSS-7 (21·5°W) downlink on the evening of May 15, with Meg Ryan, Clint Eastwood and other personalities of the celluloid world – this was the 2003 Cannes Film Festival. Unusual in that Telecom capacity wasn't being used and that BT was using BT TES-28 UKI 363 at 11·627GHz H (SR 5,632, FEC 3/4).

A few nights earlier, on the 11th, there were problems with the CNN Newsource feed to Europe at 11·563GHz H (6,117, 3/4). This is normally a very strong signal, showing 90 per cent on the level scale. On that night, from 2000 hours onwards through the evening, it fluctuated between 30 per cent maximum and nil. This may have been caused by the remnants of the tornado that had previously swept across Kansas and was still producing intense thunder storms over the NY/NE US coastal strip.

Dr Dish TV duly appeared via Intelsat 707 (1°W – Scandinavian beam) at 11·594GHz H (6,111, 3/4) on the 14th (VPID 305, APID 256, PCR 8,190). This two and a half hour programme for "TV enthusiasts" started at 1800 BST (1900 CET) and was devoted to aspects of satellite TV. Much of it featured viewers' letters/email queries, a demo on MPEG 4:2:2, reviews of numerous receivers etc. The interesting service identification was DETVSBNNI. The signal was OK in central south England, at least with a 1·2m dish, but unfortunately 90 per cent of the programme was in German. The next Dr Dish programme will be downlinked on July 16: same time and parameters as above.

A couple of scans over Eutelsat W1 (10°E) in early May

revealed minimal coverage from Iraq, but on May 3 the depressing sight of a collapsed school building and rescue work accompanied news of an earthquake in SE Turkey. This reception was at 10·987GHz H (4,167, 5/6). APTN Direct uses W1 for European distribution of news coverage – check at 10·976GHz V (4,167, 5/6). Incidentally 'ntl Winchester ad hoc MCR' has been transmitting colour bars via W1, at 11·027GHz V (5,632, 3/4). Alan Richards (Ilkeston) has also seen the 'Winchester colour bars' via PAS-9 (58°W) at 11·477GHz H (26,463, 3/4), more recently with the identification T.W.I. Mediahouse.

On May 15 GlobeCast from Quito, Ecuador was noted via Hispasat (30°W) at 12·711GHz V (27,500, 3/4). There were many Spanish regional feeds via this satellite on the 25th with election day coverage.

Suicide bomber attacks in Israel are often covered in newsfeeds via Sesat (36°E). Fox News is the main carrier, at 10·960GHz V. Following the explosion on May 19 it became apparent that there are actually two closely-spaced downlinks in operation, not one as previously thought. Normally both feeds carry similar pictures and a digital receiver's AFC will lock to one or the other, entering a single downlink in memory. On that evening however one of my receivers produced a Fox News interview while Fox News via another receiver showed a different picture. A rescan using a third receiver produced the same picture as the second one, but shifting the IF by 1MHz revealed alternative pictures. Fox News is in fact downlinking at 10·960 and 10·963GHz V (both 3,254, 5/6), though it may be necessary to scan the latter in at 10·964GHz, depending on the receiver's AFC capture range. The 10·960GHz service identification changed to 'R.R.SNG-05' but later returned to 'Fox Feed'.

I receive an Israeli test pattern via NSS 703 (57°E) at 11·139GHz V (4,648, 2/3) with the service identification SatLink 972 2533 4992 (VPID/PCR 4,194, APID 4,195). Very little news traffic is carried. This is my eastern cut-off, as 57°E just skims my neighbour's Beazer Box roof!

A note from Edmund Spencer (Littlehampton) provides an update on the wandering Icelandic TV programming. This has turned up via Astra (19·2°E): FTV RUV and NLC (Northern Lights Communication) programming has been seen at 12·226GHz H (27,500, 3/4). There's an interesting analogue offering via Turksat (42°E) at 11·766GHz V (PAL with the audio at 6·6MHz, 50µsec). It carries a Eurasiasat promotion with a scrolling caption across the lower section of the screen. This lists technical/programme changes (mainly digital) at 42°E. With several channels moving from 10°E to 42°E, there's been a considerable increase in the technical data displayed. A complete 42°E 'occupation listing' is also carried.

Broadcast news

UK RSL-TV: There have been two applicants for the Manchester RSL-TV licence, Idea Limited and Channel M – the latter is the present operator, Manchester Student TV. In my own area (Romsey) The Local Television Company, an offshoot of Curtiss Communications, is seeking premises to provide a service over a ten-mile radius that fringes Southampton and the Eastern New Forest. The plan is to be on air by Spring 2004, with ch. 48 transmissions from the Toothill mast (adjacent to the M27 Rownhams services) at 1kW. There's no news about the Lymington transmitter for this service.

Germany: Analogue transmissions will close on August 1 in the Berlin region only. On June 1 programme groups ORB and SFB merged to form RBB (Rundfunk Berlin-Brandenburg). DVB-T will start in the Westfalen/Nordrhein region next January, with transmitters at Cologne, Bonn, Dortmund and Dusseldorf, each providing 24 channels. Tests are currently being held in Cologne (ch. E10 V, 1kW) and Langenberg (ch. E10 V, 1kW and ch. E66 0·5kW).

Netherlands: DVB-T is now testing – it's called Digitenne.



Rescue workers at a collapsed school in Turkey, following the recent earthquake. Reception via Eutelsat W1 (10°E).

Initial channel allocations are 21, 23, 34, 57 and 64 at Amsterdam, Haarlem, Wormer, Almere and Hilversum, and 21, 34, 52, 57 and 64 at Alpen and Rijn.

Croatia: The HRT-3 service is to be privatised and will compete with Nova-TV. It will be expected to transmit in Croatian with the emphasis on European programming.

Bulgaria: A third national terrestrial TV channel is to be opened

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A live transmission from KGMB-TV ch. 9 Hawaii, received via NSS-7 (21·5°W).

and the Communication Commission is in discussions with the military on frequency clearance to make way for a fourth channel.

Israel: The financially troubled Channel 10, based on Tel Aviv, has secured funding that should keep it going until late August. Further efforts are being made to put the service on a firm footing.

Satellite news

I've referred to the Technisat SkyStar 2 card recently in connection with MPEG 4:2:2 reception using a PC, and mentioned a few problems experienced by enthusiasts. I am told that those with Windows 98, Millenium and XP should be OK when running at 700MHz or above. Hugh Cocks, who will be reviewing the system in these pages shortly, comments that the card is made in the US and runs hot, so that it may well require additional cooling. Check www.B2B2.com for more information on the card. There are several programs that make the SkyStar card run: if your supplier can't advise, check the Feedhunters site for help. The 4:2:2 decoding runs with Elecard decoding software. The card has auto FEC/SR and scans for signals, but suffers from poor operation management (from a sat-zapper's point of view). Hugh suggests that the program designers opted for simple 13/19/28° operation rather than for more subtle downlink reception.

Roy Carmen has discovered a true auto-search FEC/SR/frequency C/Ku-band receiver which is manufactured in China and distributed in the US. The specification looks promising and I should have a sample receiver for test shortly. More on this soon.

Check at 12·149GHz H, 13°E (Hot Bird 3) as a new London-based channel, Al-Islah, should now be in operation with a basic three-four hour programme cycling throughout the 24 hours. For more information refer to

http://www.alislah.info

The Malaysian government is considering a news channel similar to al-Jazeera/CNN, probably based at Kuala Lumpur with coverage of SE Asia.

Digital ATV

Members of the British Amateur Television Club (BATC) have taken up digital TV with enthusiasm and increasing success. Technical articles and encouraging reception reports have appeared in the BATC's quarterly magazine *CQ-TV* recently. The May 2003 issue (no. 202) is particularly interesting, and editor Ian Pawson has kindly allowed me to reproduce information from two articles, DATV – Down Under by Richard L. Carden (VK4XRL), and Analogue vs. Digital ATV – What are the pros and cons? by Brian Kelly (GW6BWX).

The first Australian digital ATV transmission took place on 3 December 2002 in Brisbane, using the DVB-S rather than DVB-T system. This avoided the need to use costly COFDM modulation. There were also uncertainties about the future (in Australia) of the 435MHz (70cm) amateur band. DVB-S hardware with known performance is available from SR-Systems for use in the 23 and 13cm amateur bands. So the Australian group bought a set of pre-assembled boards from SR-Systems, operating at 1,291MHz with a symbol rate (SR) of 6,000 and 3/4 forward error correction (FEC). A shack hook-up test of the transmission boards proved successful, using a Hyundai HS-100C receiver. Within days a further test over 3km, with VK4KI, produced perfect pictures. Subsequently grade 1 pictures from Richard's home were received at a repeater site some 54km north of Brisbane. The transmitter output was at 26dBm via a 36-element Yagi array, with reception at the repeater using a quad loop aerial. Interesting that the repeater also provides an AM video output at 426·25MHz.

Tests with different modulation, transmitter output and bandwidth parameters continue. DVB-S uses QPSK modulation. Results in the amateur bands are encouraging. For more information on ATV and DVB-S check

www.sr-systems.de/de/index.htm
www.d-atv.com
www.digitaal.com
http://www.dvb.org

The Dutch site includes much on digital TV, including DVB-S, DVB-C and DVB-T (satellite, cable and terrestrial respectively).

Brian Kelly argues the case for digital TV in general. With the use of compression technology, many more channels can be squeezed into the available bandwidth. You can get six-eight digital channels into the 8MHz bandwidth occupied by a single analogue terrestrial TV channel. Astra's analogue TV channels (19·2°E) have a bandwidth of up to 30MHz! With the move to digital at 28·2°E, literally hundreds of digital channels can be rained down on us.

As the strength of an analogue signal falls, reception becomes noisy. With digital transmission, reception quality is maintained until a threshold is reached, when pixellation suddenly occurs. With a further slight drop in signal level reception cuts out – the digital decoder ceases to operate.

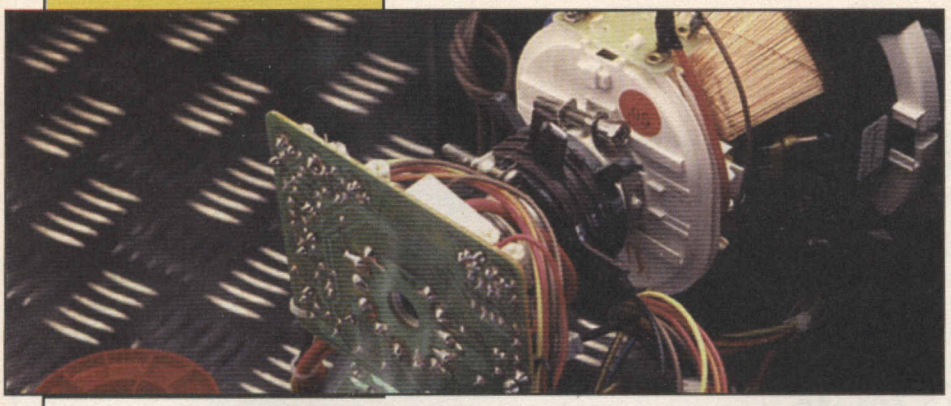
Brian discusses the different types of modulation used for digital TV (DVB-S/C/T), and concludes with a page on amateur DTV practice and related information.

CQ-TV no. 202 (May 2003) includes much helpful information on digital TV reception and operation. The BATC serves amateur TV enthusiasts both digital and analogue. For membership details apply to Pat Hellen, The Villa, Plas Panteidal, Aberdyfi, Gwynedd, LL35 0RF (01654 767 702) or email

memsec@batc.org.uk



The Israeli SatLink feeder received via NSS 703 (57°E). Note the dropout!



JACK'S WORKSHOP

In the July letters section Steve Roberts reported problems with BSkyB: he was technically in breach of contract because his digibox was unable to call the Sky computer.

The BIB contract

The BIB (British Interactive Broadcasting) contract you might sign in order to get an installation discount is separate from, and additional to, the basic BSkyB contract. It requires you to connect your digibox to a working phone line for a period of not less than twelve months. Unfortunately the Sky computer won't accept 'anonymous' calls, so your digibox will never make a successful call to it unless you enter the dialling prefix 1470 in the appropriate screen menu. But this prefix lets your 'caller ID' through for just the one call. It does not affect any other calls made subsequently. Your digibox receives a signal via satellite asking it to 'phone home'. The digibox calls an 0800 number to contact the Sky computer and report any expenditure, such as that for PPV (pay per view) movies, you have incurred.

Second subscriptions

If you sign up for a 'mirror-card subscription' to get a second Sky viewing card you will be required to connect the second digibox to the same phone line as the first one – not just for twelve months but for as long as you use it. A mirror subscription at present costs £15 a month, but BSkyB will invoice you for the full monthly subscription amount retrospectively if your second digibox is unable to contact the Sky computer. The idea is to discourage people from taking out a cheap second subscription for a friend or relative.

Monitoring

BSkyB allegedly employs a monitoring company to carry out checks to ensure that Sky viewers are not in breach of contract with respect to the phone connection. If you are in breach of contract in this respect, a warning letter will normally be sent to you before action is taken to give you an opportunity to correct the situation.

Faults

A digibox or phone-line fault will sometimes prevent the system from working. In this case you will be unable to use any of Sky's interactive services – such as ordering a pizza or buying from a shopping channel. If BSkyB says that you are in breach of contract and you can use the interactive services, it's likely that the fault is in Sky's computer system.

Errant dialling

Many people have had problems with an errant dialling system. If, for example, a 123 prefix has been entered the digibox will unwittingly call the speaking clock every few minutes when it attempts to call Sky. There will be a rather high phone bill at the end of the quarter! There have also been instances where a digibox has called a private number. If, for example, your digibox has a dialling prefix of 44, which some naughty people enter when they take a digibox abroad, it will dial 440800 which is often a legitimate local number. If this should be your own telephone number, you now know why you have been receiving so many calls from someone who simply whistles at you like a fax machine!

Battery scam

There was also a 'scam' where people would connect a 9V battery instead of a phone line. This fools the Sky digibox into thinking that a phone is connected, enabling the user to book movies up to the credit limit of a few pounds, at which the digibox would produce an on-screen message that the credit limit had been reached. The digibox was then useless until the bill had been paid! A lot of people apparently fell for this, and paid good money for a PP3 battery in a black box thinking that it would give them free movies.

Disconnection

Although you are supposed to keep your digibox connected to your phone line at all times, in practice this may not be convenient. It is normally OK simply to leave the digibox connected overnight and disconnect it in the daytime, during electrical storms and when you are away on holiday. You will obviously, for safety's sake, unplug all electrical equipment should you go away for any length of time, and BSkyB is hardly likely to object to this recommendation from the Fire Brigade. Equally this means that if you go off on a caravan holiday in the UK you can take your digibox and card with you (together with a suitable dish system).

Use of a wireless extender

If it's inconvenient to install an extension phone line to your digibox you can use a wireless extender, such as the one that's available from SatCure. It consists of two 'plug-top' units, both of which are similar to a phone charger. Plug each unit into the nearest appropriate power point then connect the digibox phone cord to one wireless unit and the other wireless unit to a convenient phone socket. This enables the digibox to use the phone line as if it has a wired connection. These units are also handy if you need to take your phone out to a power point in the shed while gardening or to the garage while working on your car.

Those with digibox problems will find much useful information at the SatCure web site. Go to http://www.satcure.co.uk

ANONYMOUS CALLS

If you are troubled by anonymous calls you can phone BT or your service provider and ask for ACR (anonymous call rejection) to be implemented. This will cost you an extra £40 a year but will block all calls from those whose number is withheld. The caller will instead be diverted to a telephone exchange message that tells him to unblock his number and try again. (If you are ex-directory and wish to unblock your number, simply dial 1470 ahead of the actual number being called.)

If you are troubled by unsolicited marketing calls, these can be prevented by dialling 0845 0700707 and registering with the Telephone Preference Service. After a month it will become illegal for anyone to make a marketing call to you unless it has been agreed beforehand in writing – be careful what you sign! The service is free.

It's possible to get virtually anyone's name, address and telephone number from the electoral register, which is sold to a number of companies in the UK. You can prevent your details from becoming public by ticking a little box on the Electoral Roll form next time you receive it (and each subsequent time).



AUDIO FAULTS

Reports from
Eugene Trundle
Martyn S. Davis
Geoff Darby
Chris Bowers
Michael Smallwood
and J.S Ogilvie

We welcome fault reports from readers – payment for each fault is made after publiation. See page 617 for details of where and how to send reports.

Sony HCD-H51

The symptoms suggested a faulty or worn laser unit: there was a 'no disc' caption in the display because of failure to read the TOC. But the laser proved to be OK, even though it was ten years old. The cause of the fault was traced to three 47μF, 4V surface-mounted electrolytic capacitors, C105/6/7, on board BD. **E.T.**

LG ADR620

The complaint with this twin-deck CD player/recorder was that a very unpleasant "popping" noise could be heard during playback of its own recordings. The owner is a musician who produces and copies his own work, and the fault had shown up only recently.

A call to LG technical revealed a late production modification to cure a "crackling or hiss audio noise". The cure is to fit a modified ribbon cable between the two decks and replace chip resistor R237 on the playback PCB with a 330Ω resistor. There doesn't appear to be a part number for this kit, but LG technical kindly sent out the parts f.o.c. **M.S.D.**

Aiwa ZR770

This four-year old hi-fi unit's right-hand tape deck refused to function. Aiwa has used a variety of cassette mechanisms, and I didn't feel that I had much hope of being able to get spares for this one, especially as Aiwa has been taken over by Sony. This particular mechanism has a solenoid arrangement, which was clattering up and down. In the past I have replaced these solenoids, but on this occasion a replacement drive belt from a scrap deck got the mechanism working. **M.S.D.**

Sony DEJ835

The complaint with this personal CD unit was "not playing discs properly". When I tried, it didn't play them at all. Lots of odd-sounding motor whirring came from the unit, but little else happened. With the lid open I could see that the optical block was halfway down its track, rather than 'home' at the centre. An experimental prod with a cotton bud moved it farther down the track, with little of the expected mechanical resistance.

Once I had dismantled the unit and removed the deck I could see that the tab of metal, which is fixed to the pickup and serves to provide a spring-loaded interface between the pickup and its drive worm, was badly twisted out of shape, presumably because someone had pushed the optical block down its track violently. It was a simple matter to remove the tab (one screw), straighten it with tweezers, and refit it. A long soak test then proved that the unit worked correctly, with no signs of sled sticking. The bent piece of metal is referred to as "rack", and is item 110 in the exploded view in the manual. **G.D.**

Kenwood RXD551

This unit wouldn't come out of standby. It was a classic example of a general problem I've mentioned before with other models. With a fault like this, where none of the front-panel buttons, including standby, appears to do anything, go round every push-button to make sure that they all move and click before you start to look for microcontroller problems. Chances are you will find that one of the buttons is stuck.

When some ham-fisted users ram the buttons in, the operating pin at the rear can be pushed down the side of the electrical switch beneath. This will keep it pressed and lock out the other controls.

In this case the problem lay with the dubbing button. I didn't have to dismantle the front panel to free it: all that was needed was to slide a scalpel blade into the gap between the button and the front panel and twist it gently until the button popped back out and reseated itself on top of the switch. The unit could then be brought out of standby, with all functions working normally. **G.D.**

Pioneer XC-L11 CD/tuner

I am indebted to the nice man at Pioneer technical for help with this one. It's part of an L11 system which, in addition, consists of an M-L11 amplifier, a CT-L11 cassette unit, and a display unit that sits on top and is connected to the CD unit via a multiway cable.

The symptoms were as follows. When the two sets of mains power to the system were applied it came on briefly, with all the blue LEDs lighting and relays clicking, then went off, leaving just the standby LED flashing. From this point on there was no response from the system. During the brief on period the display could just be seen to say, dimly, "goodbye".

Behind the rear-panel socket into which the display unit plugs there's a small PCB with a metal shielding can around it. It's a DC-DC converter that produces –37V for the VFD. There are a number of electrolytic capacitors on this board. A complete cure was achieved when, as advised, I replaced C5612 and C5611 on this PCB. Well done Pioneer technical, and thank you for making my life a little easier! **G.D.**

Sony TA-VE150

The customer's complaint with this AV amplifier was "some channels not working". The usual problem with this and similar models in the same range is bad joints at the output ICs. But with that fault the unit usually goes into the protection mode,

with no outputs at all rather than just some channels being absent.

As a first check I set the unit to the 'Dolby 5.1 input' mode. All five main channels worked fine, which proved that the output stages were OK. If any other input mode that involved signal processing was selected however only the front channels seemed to work. It was apparently this that troubled the owner when he tried to use his TV set with the system.

I find it increasingly difficult to get my head round all the sound modes one has to cope with nowadays – AC3, Nicam, Dolby Pro-Logic, Dolby 5.1, analogue input, digital coaxial input, digital optical input and so on. When I referred to the user manual I gave up trying to work out what the amplifier was supposed to make of the two-channel output from a TV set and instead concentrated on the confusingly-named ''DVD 2CH' mode/input. Although this consists of two electrical channels physically, it carries the full six Dolby-encoded audio channels. This mode produced no rear and centre outputs from the DVD player that was on soak test on the bench. As a further check, I tried the 'simulate' mode with a straight stereo source fed to the 'video' input socket. Again there were no rear-channel outputs – 'centre' is not relevant in this mode.

All this led me to the conclusion that there was a decoding problem, which pointed to IC300, a 64-pin flatpack IC on the underside of the PCB. This IC is labelled 'Dolby Pro-Logic Decoder' on the circuit diagram. There's little other than this chip between the input sockets and the power amplifiers, so I ordered a replacement and fitted it. The new IC restored audio from all channels, as appropriate, in all modes. **G.D.**

Panasonic SA-AK28

The only response from this unit was the error message F61 in the display. It means that the protection circuit is in operation. The usual cause is DC offset at one or more of the output channels, because of a failed hybrid output IC, but it's hard to prove the point without first disabling the protect circuit.

The easiest way to do this is to unsolder pin 6 of connector CN302 and isolate it from the surrounding print. This pin carries the 'DC detect' signal: it's the link between the error-detection circuit, which consists of Q311, Q352, Q307, D306 and D307, on the main PCB and the microcontroller chip IC600 on the 'panel' PCB. Disconnection of this pin enables the voltage at IC600's error-detect pin to rise, thus making a normal system power up possible. You should of course ensure that no speakers are connected to the system at this time, in case there's a DC offset problem present.

In this case checks, once the unit had been forced to power up, showed that the problem was not caused by an output stage offset. So attention was turned to the other things monitored by the protection circuit. Foremost among these are the main supply rails, which are monitored by the two double-diodes D306 and D307. D306 checks the 10V and LED 9V supplies, while D307 checks the 15V and 7·5V supplies.

D307's inputs were both missing. This led me back to IC501 on the power PCB. It's a 19-pin regulator that's on the same heatsink as the output hybrid IC. Internally it's just a bunch of power transistors, regulation control taking place externally. The two missing supplies come from pins 11 and 12. The 15V output at pin 12 is connected to chassis via a 16V zener diode, presumably to protect the circuits it supplies in the event of a voltage rise. This zener diode was short-circuit. As the 7·5V supply is derived from the 15V output, it follows that with the zener diode short-circuit this supply will also be missing. A replacement zener diode failed to restore the outputs however, although there was the correct input at pin 14 of the IC.

The circuit diagram shows IC501's internal arrangements clearly. The electrodes of the various transistors are all connected to pins, so it's possible to check these devices with a meter. Several had failed. A replacement IC (type STK470-020A) restored the 15V and 7·5V supplies, but not the 15V input to D307. This was because the 2·2Ω surface-mounted resistor R312 on the main PCB was open-circuit. Once this item had been replaced the fault detector went back to sleep and I was able to reconnect pin 6 of CN302.

The whole unit now powered up normally and worked, except that the CD changer was jammed. Retiming this, and replacing a missing disc spacer (there should be five of them) with one from a scrap unit, restored full operation. I subsequently found that the CD changer jam had been the original problem, and that the owner had had a go on the kitchen table . . .**G.D.**

Sony HCD-N355

Manual volume control was not possible though it worked fine using the remote-control unit. Close inspection of the front panel board inside the unit revealed the cause, which was the rotary-encoder switch S579. A replacement, part no. 1-473-392-11, restored manual volume control. **C.B.**

Sony MZR-700PC

There was no sound output from the left-hand side of this MiniDisc player's audio jack. The cause of the problem was quickly traced to the headphone amplifier chip IC302, which had become unseated from the main board at one side. All I had to do to restore normal sound was to resolder this surface-mounted IC, using a fine-tipped iron. **C.B.**

Sony HCD-H901AV

This unit had no fluorescent display. The cause was on the main board, where the fusible resistor R814 (0·33Ω, 0·25W, 5%) had gone open-circuit. A replacement, part no. 1-219-122-91, restored the display. **C.B.**

Sharp MD-SR60E(GL)

This MiniDisc recorder sometimes failed to read the TOC. It wasn't tracking and didn't move reliably from track to track. The cause of the trouble was the plastic helical pinion gear on the laser assembly drive shaft. It had split and was slipping. Gluing it didn't work, because the split could not be closed and the gears would not mesh after going over the gap.

CPC put in a special order for the part, using the pictures I emailed from the Falkland Islands – the part no. is SHNGERH0597AFZZ.

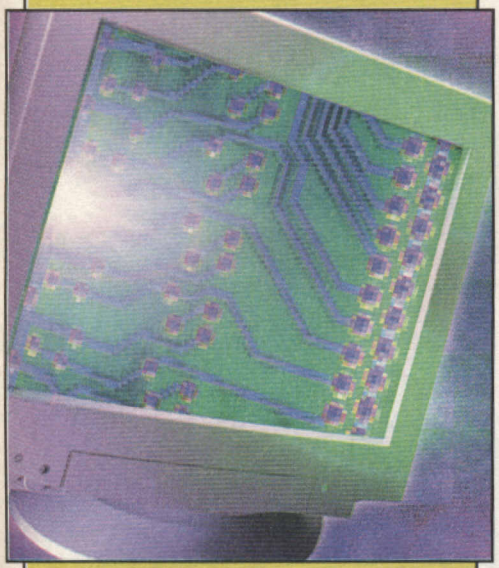
I softened the new gear a bit by heating it in boiling water before pressing it on to the shaft, then put the recorder back together. **M.S.**

Sony HST-V302

Intermittent loss of sound from one or both channels in this music centre is usually caused by dry-joints at the STK4132II output chip IC401. **J.S.O.**

Welltech car radio/CD player

The customer had, as so often, reversed the supply polarity when fitting this unit. When you get this problem, check the in-line fusebox/choke unit where you will find the protection diode short-circuit. The 1,000μF, 16V capacitor next to it should also be checked as it usually pops. Also check R440, R533 and R715 in the unit: they are all 1Ω and usually go open-circuit. You may find that the reverse-polarity supply has knocked out IC801 (TDA7377). I had to replace all these items on this occasion. Hopefully if the customer fits it correctly this time I won't see it again. **J.S.O.**



MONITORS

Fault reports from
Gerry Mumford
Alun Rawson-Williams
Bob Bradley
and
Ian Field

We welcome fault reports from readers – payment for each fault is made after publication.

Reports can be sent by post to:

Television, Fault Reports,
Anne Boleyn House,
9-13 Ewell Road,
Cheam,
Surrey SM3 8BZ

or e-mailed to:
tessa2@btinternet.com

Hansol Mazellan 900P (Model B19AL)

There were two strange horizontal lines in this monitor's display and the middle third seemed to be slightly blurred, almost as if the frame linearity was cramped in the centre region. A look at various test cards was no real help in deciding whether it was a frame or a dynamic-focus (DBF) fault. As a check, I disconnected pin 32 (dynamic focus parabola output) of the scanning processor chip, effectively removing the dynamic-focusing operation. The lines disappeared, and the edges of the picture were now blurred – this is the usual symptom when the DBF is disabled.

As the line- and frame-frequency AM parabolas at pin 32 were correct, I traced them through the output stage, where I found that the middle section of the frame parabola disappeared. This gap in the waveform narrowed as time progressed, indicating that the fault had a thermal characteristic. Use of heat and freezer finally pinpointed the cause, which was the KSP44 output transistor Q746. A replacement (use type MSP44) cured the fault.

Since then other KSP44 transistors in the DBF output stage in these monitors have caused similar faults. There are six of them in all, and the whole area looks heat stressed. So for continued reliability we now replace them all. **G.M.**

Samsung SyncMaster 17Gli (Model CMG7377L)

We've had a number of these monitors recently all with the same fault, big dry-joints on the CRT base-connector socket. The symptoms vary widely, depending on which pins are affected. They include one or more colours flickering or missing, display fading and an intermittent display. Surprisingly, there have been no dry-joints anywhere else on the CRT neck panel or the rest of the chassis. **G.M.**

ICL ErgoPro 141V (Hyundai chassis)

This monitor powered up with light from the green LED but there was no display. First thoughts were that the tube's emission was probably very low, as this model uses the infamous Samsung type – these can go so low that the display disappears altogether. The EHT was missing however, and the 2SC5149 line output transistor Q302 was found to be dry-jointed and short-circuit. There were further dry-joints at the line output transformer, underneath the metal screening plate, and the fusible feed resistor R340 (1Ω, 1W) was open-circuit. The base-drive coupling capacitor C313 (10μF, 100V) read a little low, so this was also replaced. When the monitor was tested after fitting the replacements and attending to the dry-joints there was a first-class display, which is very rare now with these monitors. **G.M.**

Logix LGX173F

This ergonomic monitor, with a natural flat screen, was totally dead. Checks showed that the line output transistor Q433 (2SC5386) was short-circuit. No other fault could be found, so a replacement was fitted then the unit was tested. As soon as power was applied there was a huge loud crack and the unit was dead again.

This time Q433 had survived, but the power supply had blown up, destroying the chopper power IC Q868 (2S0678) and the fusible feed resistor R808 (0·22Ω, 2W). All was well once these two devices had been replaced, and there was a superb display. Note that the 2S0678 is a very rare device. The only source is scrap monitors. It can be found in Hansol, Tatung, Hyundai and other Korean monitors. **G.M.**

Hansol 501P (Model B15BL)

This monitor's brightness fluctuated wildly. As tapping the unit made the fault worse I decided to carry out an inspection for dry-joints. The cause was soon found, at the connection to the line output transformer's earth pin. It was very dry and crusty. **G.M.**

Apple M6300 Performa computer

This PC's power supply, a separate unit, was made by at least two companies. Type DCF704 was made by Dyna Company Inc. in India while type AA19300 was made by Astec in Singapore or China. The DCF704 is better built and more reliable. Both use similar circuitry, but the component locations, circuit reference numbers and component values differ. There are four LT outputs, 5V at 80mA, 5V at 7·9A, 12V at 2·15A and –12V at 0·2A.

You can find the AA19300 type dead with the mains fuse blown and signs of overheating around Q3 (IRF820) and the T7805CT 5V regulator. Repair usually entails a major circuit rebuild and should be attempted only when the print has not been damaged to such an extent that there may be a fire hazard. Most of the components on the primary and secondary sides of the standby switch-mode part will be found damaged. The main switch-mode section is usually unaffected.

Another fault condition with this power supply is dead with the mains fuse intact, the 5V standby supply present, and signs of R28, R44 (both 150Ω) and R14 (120Ω) overheating. Replace these three resistors and check C8 (22μF, 35V) and the

1,000μF, 16V electrolytic C10 for loss of capacitance, the BZX55C9V1 zener diode Z6, and the FEP16DT full-wave rectifier on the secondary side of the main switch-mode power supply. The full-wave rectifier may have one or sometimes both diodes short-circuit.

If the DCF704 power supply is dead with the mains fuse intact, check R16 and R17 (both 220kΩ, 1W) which can go high in value or open-circuit. Also check the 12V, 500mW zener diode CR6 (1N5242 or BZX55C12V) which can go short-circuit, and the FEP16DT double-diode on the secondary side of the main power supply – either one or both diodes may be short-circuit.

The Dyna DCF825 is a more powerful variant on the M6300 power supply. The usual fault condition is dead with the mains fuse intact, HT at the main reservoir capacitor but the 5V standby supply missing. In this event check the standby switch-mode power supply's start-up resistors R16 and R17 (both 220kΩ, 0·5W). If one is high in value or open-circuit, replace them both. **A.R-W.**

Digital PCXCV-VA

The report said that the top half of this 14in. monitor's display was blank. When I switched it on more than two thirds of the display was missing. But it wasn't a frame timebase fault: the fault was causing the video to be blanked out. As the monitor warmed up however the rest of the display gradually started to appear, in the form of a horizontal band that got wider. After about twenty minutes almost the whole display was visible.

The fault appeared to be a thermal one, so I decided to try heating and freezing various components in an attempt to instigate it. Some effect was noticeable while applying freezer in the power supply, so I used the oscilloscope to check for ripple on the supplies from the secondary side of the chopper transformer. There was a high percentage of ripple on the 12V supply, which is derived from D912, because the associated reservoir capacitor C919 (470μF, 16V) had fallen in value. There was normal operation once this item had been replaced. **B.B.**

Iiyama S102GT

This 21in. **Vision Master 502** monitor was dead. After dismantling the heavy metal screening that surrounds the chassis I soon discovered that transistors Q5A5 (2SA1988) and Q5A2 (2SC5294), which are clipped to a large aluminium heatsink in the line output stage, were both short-circuit. I fitted replacements then switched on again. The EHT came up, but there was only a 3in. wide vertical band in the centre of the screen. I could smell something getting hot so, after quickly switching off, I tried to determine the source of the smell.

I couldn't see any burnt components but, as I examined the PCB, I noticed a small inductor (L5A3) that was red-hot to touch. It's in the vicinity of the previously replaced transistors. I removed it and examined it closely, finding burnt enamelled-copper wire underneath the insulation of the winding. The part no. is 751Z904A20. Normal operation was restored once a new coil and two new transistors had been fitted. **B.B.**

Compaq V55

There is only one thing more annoying than an intermittent high-pitched whistle from a monitor, and that's to have a repeat call for the same fault because you were unable to determine the cause on your first visit. This monitor was subsequently picked up for workshop attention, so that more detailed checks could be carried out and soak testing undertaken.

After careful testing I found that the cause was L401 in the line output stage. When it was removed and dismantled I found that the inductor has a ferrite former that consists of two parts, an upper bobbin with a winding of Litz wire and a lower mounting part with solder tags. The two parts should be cemented together and encased in a heat-shrink sleeve. But the cement had cracked, with the result that the bobbin could vibrate at high frequency inside the sleeve.

The cure is to cut away the old heat-shrink sleeve, being careful not to damage the winding, smear a small amount of silicone rubber compound (RS Components) on the surfaces of the upper and lower sections of the ferrite former, press them together and allow to dry before applying a new heat-shrink sleeve.

After resoldering L401 to the PCB I gave the monitor a long soak test before returning it to the customer. **B.B.**

Viewsonic E70

This 17in. monitor blew its BU4522AX line output transistor (Q407) intermittently. The cause was not at first obvious, so I went through the usual routine of checking its supply voltage, drive waveform, the tuning capacitor etc. Everything seemed to be in order. I was beginning to suspect the line output transformer when I noticed that its pins are soldered into eyelets, and that the solder at one or two of the eyelets looked crystallised around the edges where it should make good contact with the printed circuit. Reworking the pins and eyelets cured the problem. **B.B.**

Time/LG 520Si

This is not a nice monitor to work on. The under-chassis metal plate is held under the same screws as the plastic chassis tray so, if the plate has to removed to gain access to the print side for tests and measurements, the monitor has to be almost completely dismantled then put together again without the metal plate! The plastic tray is held at the back by two screws that also secure the excessive number of earth straps to the rear of the metal tray. This work has to be repeated when the repair has been completed. There's a risk that an earth strap might be missed and fall on the circuitry, with unknown consequences. There is also a loop of wire that's wound over the scanning yoke: it comes out as an orange and yellow wire that's soldered to the PCB. Releasing the metal plate was enough of a struggle to begin with, and I couldn't get to the solder side until I did, so I cut the wires and fitted an in-line connector which I insulated with a combination of heat-shrink tubing and hot-melt glue.

The monitor was dead because the 3·15A fuse had blown. When you get fed up searching everywhere for it, look under the gigantic mound of hot-melt glue piled up against the side of C902 behind the mains connector! Neither the STRF6653 chopper device nor the mains bridge rectifier was short-circuit. The degaussing posistor is a relay-switched single-pellet type. These have not shown the same tendency to blow the fuse as the two-pellet continuous-operation type. The mains-filter capacitors are of the 'self-healing' type that rarely show any signs of leakage after an internal breakdown unless the rupture is so severe that a capacitor overheats and is visibly damaged. As a precaution I checked the rectifiers on the secondary side of the power supply, the B+ supply regulating MOSFET, and the line output transistor. These were all OK. So I fitted a new fuse, which brought the monitor back to life.

The power supply has no isolating on/off switch and is thus disconnected from the mains supply only when unplugged or routed through the switched outlet on the base unit. When the monitor is not in use the power supply continues to run virtually unloaded, so a rapid series of mains transients could easily account for failure of one sort or another.

STR-type regulators gained a rather dubious reputation in the early days, but more recent designs seem to be much more robust. Nonetheless the monitor was given a lengthy soak test, including a long period of waiting in standby as well as running. **I.F.**



VCR CLINIC

Reports from
Bob Flynn
Dave Gough
Gary Laidler
Martyn S. Davis
Matthew Biddlecombe
Graham Richards
and
Michael Smallwood

We welcome fault reports from readers – payment for each fault is made after publication. See page 617 for details of where and how to send reports.

Akai VSG796EK

The brakes didn't work correctly when a tape was stopped after wind or rewind, and as a result a lot of loose tape would build up. This can be caused by the mode switch, which was found to be very mucky inside when removed. But cleaning it didn't cure the problem. The cause was on the take-up spool brake assembly, where the felt of the hard brake had become dirty and hard. I cleared the fault by cleaning the felt and the surface of the spool. **B.F.**

Panasonic NVHD620 (K deck)

The mechanism would stop intermittently with F06 in the display. This problem can be caused by the white plastic loading arm, which was warped away from the carriage, but a replacement made no difference. The cause was traced to poor solder joints at the centre LED, D1. **B.F.**

Sony SLVE230UY

When it was asked this machine tended to load/unload intermittently. Checks in the loading mechanism showed that the coupling on the motor was cracked (just like with Panasonic machines). A replacement cured the fault. **D.G.**

Philips VR165

The problem with this VCR was lack of tracking-control pulses – for once it wasn't the pinch roller! Fortunately I had the circuit diagram, which made matters much easier, and soon traced the cause of the fault to transistor Tr7469 (BC848). **G.L.**

Daewoo V435

The complaint with this VCR was no playback or record colour. Careful use of the hairdryer and freezer led me to C402 (0·022μF) which went open-circuit when cold. **G.L.**

Aiwa HV-FX7700K

This VCR was dead. Once I had managed to get the PCB out I noticed that C116 (1,000μF, 16V) had a dry-joint at its negative pin. As it was also a bit discoloured and read low when checked with my capacitance meter I decided to fit a replacement. Fortunately everything then worked correctly. **G.L.**

Philips VR765

This machine appeared to be totally dead. When you lift the lid you see a metal-encased standalone power-supply unit at the right of the chassis. A quick meter check revealed that the fuse was intact and that there were no obvious output voltages, though one of them appeared to be pulsing up and down. This suggested the presence of a short-circuit somewhere on the secondary side.

When I removed the ribbon cable to isolate the power supply I discovered that the short was on the power-supply panel itself. I decided to check the rectifier diodes and found that D6165 (BYW98-200) was dead short. The part number is 4822 130 11584. **M.S.D.**

Toshiba V230K

This machine arrived with a Harry Potter tape loaded but not laced up. When play was pressed the machine immediately powered off, as the mechanism was out of sync. The cause of the fault was a small, white triangular piece of plastic that sits on top of a pillar. Its job is to lift up the cassette flap as the tape descends. It had split and twisted round on its post: a spot of superglue fixed this.

Realignment of the mechanism is fairly simple, as all the main parts are well marked with timing indications – dots and arrows etc. The difficult part was removal of the tape without causing further damage, as the mechanism is held in place by a screw that's hidden right beneath a fully-loaded tape. I eventually achieved this by 'crowbarring' the cassette slightly and forcing a small, flat-bladed screwdriver to rotate a two-point Phillips screw at an angle of about 20°.

Crowbarring VCR decks that have been ingeniously designed to make them impossible to dismantle without causing damage makes me feel like a true engineer! **M.S.D.**

Bush VCR880NVP

According to the customer this VCR played back in black-and-white with both prerecorded tapes and its own recordings. When I tried my test tape in it the E-E was in colour but the playback was switching between colour and monochrome. It wasn't a job I fancied doing sat on the floor cross-legged, so I took it back to the workshop.

When I tried the machine out in the workshop what little colour there had been in the house had gone, the hi-fi sound was now poor – as if the heads were worn – and the head switching point was way out. I removed the deck and was about to release the clip to take out the main PCB when my hand brushed against one of the electrolytics on the secondary side of the power supply. It felt remarkably warm considering that the machine had been in operation for only about three minutes. Tests showed that C016 (470μF) and C019 (330μF) were both low in value at about 180μF. The adjacent electrolytic C021 (100μF) read correctly but was also warm. So I decided to replace all three. Fortunately this cured all three problems. You just get lucky sometimes!!

Incidentally the bright spark who designed this machine considered it necessary to fit three screws to the screening

cover over the heads. Two of them can be reached from the top of the VCR, but the third is located at the rear. Yes, you've guessed it, the whole deck has to be removed to get at this screw, just so that you can clean the heads. Much though I hate leaving screws out of VCRs, I returned this one to the customer minus one stupidly placed screw! **M.B.**

LG N311

I suspect that this may become a common problem. When play or rewind was selected the machine would revert to stop after a few seconds. The cause of the problem was grease that had become detached from the cam gear and blocked the supply-reel sensor. A good clean was all that was required. **G.R.**

Sanyo VTC5000

This Betamax old-timer made me feel quite nostalgic. It had two problems: tape looping, and hum bars in playback and E-E. The first was caused by a broken reel-supply belt, between the take-up and supply spools. These tiny belts are still available, in packs of two, from CHS.

The hum was caused by two electrolytics in the power supply, C5101 (2,200μF, 35V) which was open-circuit, and C5203 (100μF, 100V) which was leaking electrolyte. After fitting replacements I made a test recording – and was surprised how good the playback was. **G.R.**

Orion D2000

The customer had broken the cassette lift when removing a cassette, so I fitted a housing from a scrap D1094. It then started to eject a cassette only to take it back in before eject was completed! I realised that I had fitted a cassette housing with a differently sized drive pulley. All was well once I had swapped over the drive pulleys. Cleaning the mode switch completed the repair. **G.R.**

Philips 14PV165/20PV165

I've had a number of these machines with the following faults. (1) No sound with the volume OSD stuck at minimum. (2) No text. (3) Won't record pictures, only noise, but playback OK. (4) Certain OSD functions not working, e.g. tuning/install menu. (5) Mechanism stopping intermittently and tape transport behaving erratically.

In every case the cause has been the 24C02 memory IC. The faults may be present individually or some, e.g. (2) and (3), may appear together. **G.R.**

Matsui VP9405

This VCR was dead apart from a squealing noise that came from the power supply. I also noticed that the chopper transistor Q506 was getting very hot. The cause of all this was a short-circuit on the secondary side, the culprit being D512. I fitted a BA157, but the machine then wouldn't eject the customer's tape. So I stripped, cleaned and aligned the mode switch. After that the machine was back in working order. **G.R.**

Toshiba V711UK

There was either no stereo sound or it was very faint and distorted. Mono sound was OK. I found that there was no 12V supply at IC801 because of a crack in the PCB where there's a hole through it, next to the loading-motor power socket CN601. The board is stressed here when the capstan-motor connector plug is being pushed home during assembly.

Several other tracks were cracked, the most difficult to repair being the audio right out and audio left out. These were dealt with by stringing wires across the PCB, from C801 (R)/C802 (L) to C524 (R)/C525 (L) at IC501. **M.S.**

Test Case 488

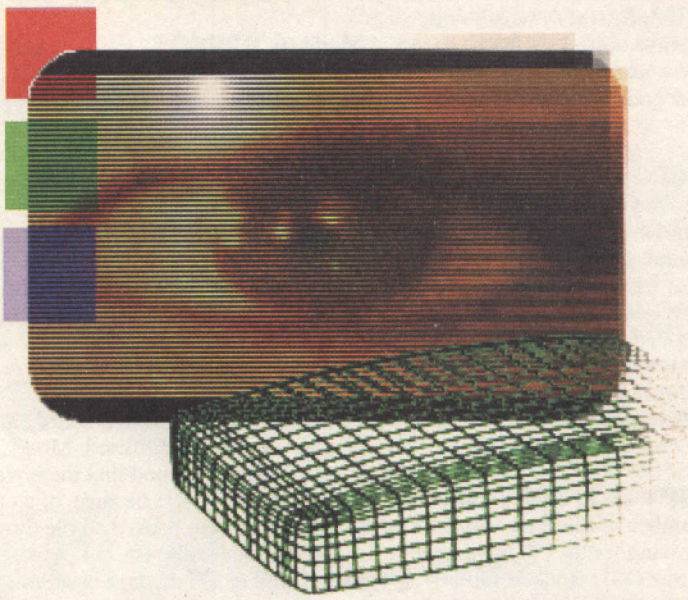
The Test Case workshop does not normally get involved with camcorder matters – these days it's such a complex business that repairs have to be carried out in specialist high-tech workshops. Not all videography problems involve repairs or soldering irons however, and Victor the Video is a good customer of both the shop and the service department.

Some years ago Victor bought one of the first mini-DV camcorder models, with DV-out but not DV-in and a two-speed recording system. It worked long and well, but was recently replaced with a new model – to take advantage of the better features and performance now available, and to get the DV-in facility that enables Victor to archive his edited masters on digital cassettes rather than 'lossy' VHS or S-VHS tapes. To his surprise, Victor found that LP recordings made by the old camcorder couldn't be played properly with the new one. The pictures were mostly broken up, pixellated or missing altogether. Likewise the accompanying sound. Old SP recordings came through fine with the new machine however. What do you make of this, and what solutions might there be?

Before Victor got into digital recording he had a couple of analogue camcorders, the second of which was an S-VHS-C type. It was the bee's knees when he bought it, but its pictures now seemed somewhat messy and blurry in comparison with those produced by the new digital camcorder. Despite this some of the footage was worth keeping, if only it could be preserved with little or no further degradation. There were some movies of his brother launching off Windy Hill with his hang-glider, of Victor himself playing with his beloved dog Max, who has now gone to that great kennel in the sky, and of other precious stuff. How, he asked our worthies, could he get this into his PC and on to its great big hard disk? This was not a difficult one to answer.

Now that Victor the Video is getting established in the wedding (and similar) video business, he increasingly finds that his customers are dissatisfied with the VHS cassettes they get from him, beautifully labelled and cased though they are. Some of his rivals in the business have moved on to DVD production, offering a better product: sharper pictures, slicker presentation, indexes, chapters and – in true Hollywood tradition – out-takes. But he had heard of compatibility problems, especially with clients who had older, standalone disc players. The technicalities of DVD–R, DVD+R the others are beyond him, nor does he care, but there's a spare bay in his quite modern PC and he knows that disc-authoring and -burning equipment is readily available and not too difficult to operate, especially by someone who's already mastered (well, almost!) the black art of video editing with a home computer. So what format should Victor go for, and which type of disc should he use in his business? The cost of the disc-burner varies little between the competing formats, likewise that of the blank discs.

This one was for Sage, in consultation with our PC man Doc Colin at the shop. A few weeks later Victor was happy and busy, climbing up more learning curves, with all his basic problems solved. To see how, turn to page 633.



TV FAULT FINDING

Reports from
Michael Dranfield
Philip Salkeld
Denis Foley
Glyn Dickinson
Arthur Jackson
James Grant
Jerry Fedorak
and
Graham Richards

We welcome fault reports from readers – payment for each fault is made after publiation. See page 617 for details of where and how to send reports.

Sony KV14T1U (BE4 chassis)

This set tripped at switch on. I didn't have a service manual, and on investigation was surprised to find so many dry-joints in such a newish set. Resoldering them failed to cure the fault however. The field output chip had been dry-jointed and was thus suspect, but the set tripped out so quickly that it was impossible to carry out any measurements.

The solution was simple. I removed the CRT heaters' ballast resistor R729 on the base panel and used my bench power supply to power the heaters. Then, at switch on, field collapse was visible for a split second. A new TDA9302H field output IC cured the fault. **M.D.**

Sharp 76FW-53H (DA100 chassis)

The customer said that the width came in then the set died. The basic cause of the trouble was a dry-joint at C611 (1μF, 250V) in the EW-modulator circuit. I found that the 2SD2391 EW-modulator driver transistor Q506 hard burnt to a cinder. It's surface-mounted, and as a result had done as much damage to the board as possible. After repairing the print I had to replace the following components in the EW modulator circuit: C611; Q506; the modulator diodes D603 (BY228) and D604 (BY299); coils L603 and L604; R610 (1Ω, 0·5W fusible); C528 (10μF, 63V); D502 (DX0551); and D516 (C47BZT03).

For good measure I also decided to replace optocoupler IC705 in the power supply and fit an avalanche diode (RH-EX0875BM) across the HT line, as recommended by Sharp. Do not solder the optocoupler at a temperature of more than 220°C.

Thankfully after replacing all these components and attending to various dry-joints the set came on first time. **M.D.**

Philips 32PW6526-05 (SA10E chassis)

This set produced the word 'locked' in the middle of the screen. You get this situation when the customer has forgotten the pin number. Here's the remedy: switch the set on; press menu; got to features and press enter; go to parental lock and press enter; put in code 0711; then put in code 0711 for a second time. The lock will now be cleared. **P.S.**

Toshiba 28W23B (11AK37 chassis)

As mentioned before, a power supply blow-up can occur with these sets. The items involved are IC800, Q801, D892/3, R805, R852 and R855. This particular set worked once these components had been replaced, but when it was put into standby a peeping sound came from the power supply. This was put right by replacing the optocoupler, part no. V30015087. **P.S.**

Sharp 76FW-53H (DA100 chassis)

The customer complained that the picture was too wide, i.e. there was an EW fault. The usual cause is C613 (560nF, 250V), but not on this occasion. Time to get out the scope. A check at pin 32, EW drive, of IC801 produced just hash. The cure was to replace this IC, which is type VDP3120B (part no. RH-IX1688BMN2). **P.S.**

Philips 21PT1664-05S (SL9.2E AA chassis)

This was supposed to be a workshop job but had to be dealt with in the field. The customer had complained about distorted sound. When the distortion was heard in the customer's home I was able to diagnose the cause, which was the speaker. A replacement cured the problem, but it's quite expensive at over £24 plus VAT. The part no. is 482224010396. **P.S.**

Bush 2868NTX (11AK19 chassis)

A dead set with the line output transistor short-circuit is a well-known fault with these sets. After fitting a replacement however you sometimes find that when the set is brought out of standby there's still no EHT. The cause is a dry-joint at

link J613. It's becoming quite a common problem. **P.S.**

Beko 30128T

Lack of height has become a rare fault nowadays. In this case the height varied as the set warmed up. Use of freezer revealed the cause, which was R1381 (1Ω, 1W). It's a stand-up resistor that's next to the LOPT. **P.S.**

Philips 25PT4521-05 (MD1.1E chassis)

A fault you can get with these sets is no sound and picture with the on-screen display normal. The symptoms are often intermittent, so it's worth examining the Aquadag earthing spring. It can come adrift when the plastic securing lug on the tube rim has broken. The spring is just long enough to short the Aquadag to a heatsink on the chassis. This removes the picture. **D.F.**

Hitachi CPT2888 (Salora K chassis)

Yes, I know! But it belongs to the manager of my local Indian restaurant and just fits in his cabinet. Anyway, there were obvious field faults, with foldover and flyback lines on the picture. The 25V supply to the TDA3654 field output chip was low at 19V. Replacing the rectifier, reservoir capacitor and surge-limiting resistor in the supply didn't help, but when I fed 25V in there was a good picture. Field output stage power consumption was 0·8A, which I felt was a little high, so I replaced the IC just in case. No luck.

I decided to check where else the 25V went. The voltage and current were correct when the tuning PCB was removed. I then found that TC113 (BC557B) and DC113 (6·8V zener diode) associated with the memory chip were both short-circuit. Vegetable dansak and saag aloo I think! **G.D.**

Daewoo GB20C4T

This set was dead with a short-circuit line output transistor. A common cause is an arcing transformer, but on this occasion the HT was very high. The reference voltage for regulation is developed within module I802. A replacement cured the problem – the part no. is 4850M04710. **G.D.**

Fidelity CTV3128

This Supermarket set also turns up as the **Wharfedale 550** – usually with a blazing on/off switch. But this set's picture shifted to the left a few seconds after it came on. The line shift control associated with the TDA8361 jungle IC did nothing, and replacing it and the IC made no difference. While I was checking waveforms the line output transistor went short-circuit. Its replacement became fairly warm, and I found that the base-drive waveform had a spike on it. Normal operation was restored when the line driver transistor was replaced. **G.D.**

Grundig CUC2040 chassis

The complaint with this set was "intermittent". It was suffering from the Philips scan-coil syndrome (dry-joints on the sub-PCB). When this fault had been dealt with there was severe EW distortion. Replacing R55006 (5·6Ω, fusible) restored the width: the TDA8350Q IC had to be replaced to cure the bowing. **G.D.**

Matsui 28WV2N (Grundig CUC2059 chassis)

The most common fault with these sets is dead with blown fuses. Replacing the BUZ90A chopper transistor T6006, the TDA4605-3 chopper control chip, R60001 (270kΩ), R60002 (68kΩ) and the fuses will restore normal operation – unless you power up with a variac, in which case the BUZ90A will go short-circuit almost instantly! Don't ask me why. **G.D.**

Crown CTF25NT

This is almost a CTV25 – anyone remember them? It was stuck in standby, but fortunately the relay clicked and the main power supply produced 148V. This supply didn't get to the line output stage however, because a blob of black glue had eaten its way through the print. Its removal and the addition of a link cured the problem. No shortage of screws to hold this set together! **G.D.**

Hitachi C2117TE

This set uses the same chassis as **Models C2114/2119**. It went off on channel change after an hour. Although the cause of this can be microcontroller chip failure, on this occasion the cause was simply that the HT was slightly high at 117V. Replacing R951 (39kΩ) and R953 (47kΩ) in the error amplifier circuit with close-tolerance types restored the HT to 112V without need for adjustment. **G.D.**

Thomson ICC9, TX92 chassis etc

After line output transformer replacement in one of these sets it may still appear to trip. This is because the faulty part has activated child lock. Simply use the remote-control unit to bring the set out of standby. **G.D.**

Philips 32PW6515 (A10E chassis)

This set produced a very bright screen with horizontal lines then switched itself off. A quick check showed that the 200V supply to the CRT base panel was missing. Cold checks at its source revealed that D6445 was short-circuit and the 1Ω surge-limiting safety resistor R3445 was open-circuit. Replacing these items restored the 200V supply, but the symptoms remained as before. R3840 (100Ω safety) on the CRT base panel was open-circuit. It's connected between the 200V supply and the RGB output chip IC7830. Replacing this item completed the repair. **A.J.**

JVC AV-N280EKT (BY11 chassis)

The complaint with this set was "only external input working". When I checked it there were no stored channels. They could be tuned in but not memorised. Although this is a complex-looking chassis with a high component count it appeared to be similar to the 14in. JVC models we see more often, and we know that these require a –30V supply to the memory circuit for channel storage etc. The station select module in this set also requires –30V. A check at pin 10 of the memory chip IC001 showed that it was missing. The supply reached the module, at pin 26, and was present at both sides of R092. But the print to pin 10 of IC001 was open-circuit because of electrolyte leakage from C017, which decouples this pin. Cleaning the PCB, rewiring the print and replacing C017 completed the repair. **A.J.**

Sanyo CE32WP4 (EB6 chassis)

This widescreen TV set's vertical and horizontal picture geometry were badly corrupted. When I checked the service manual I found that we had attached to it a 'service flash' from the excellent Sanyo technical department. It provided modification details to correct the fault and prevent a recurrence. It appears that the corruption can occur during a reset cycle. A 'geometry kit' that includes a new PROM device, IC802, is available from Sanyo. It includes full fitting and setting up instructions. Two kits are available, so make sure you specify the model number when ordering. The kit provides a reliable repair. **A.J.**

Thomson 32WR22 (ICC17 chassis)

This 32in. widescreen set appeared to be stuck in standby, but a whining noise came from the power supply. Cold checks showed that there was a short-circuit across the collector and emitter of the line output transistor TL34, but this device was OK. The cause of the trouble was in

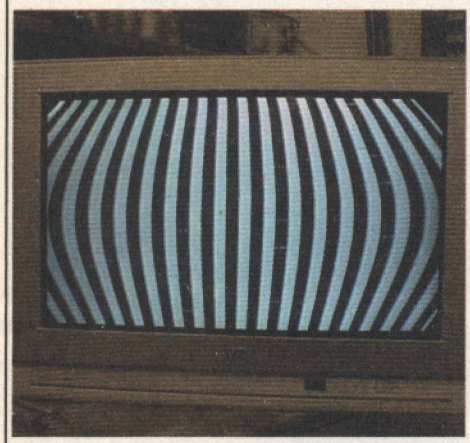


Photo 1: The unusual symptoms sometimes present with a JVC Model AV28X10EKS.

the associated EW diode modulator section, where DL21 (BY228) and the driver transistor TL41 (BD241C) were both short-circuit. **A.J.**

Nokia 5524 (Mono Plus chassis)

No sound or picture was the complaint with this set. Unusually, the actual symptoms were field collapse and no sound. While looking for a common cause I discovered that the 8V supply to pin 10 of the signals processor chip DD01 was missing. It comes from a series regulator transistor (V033) which is fed with 12V from the chopper power supply. R033 (15Ω) in the feed to V033 was open-circuit. All was well once this resistor had been replaced.

I was wondering how line drive could have been present, as DD01 contains the line generator. The answer is that the IC has a second supply at pin 36. **A.J.**

Mitsubishi CT2525TX (Euro 10 chassis)

These popular sets can still produce an excellent picture. But, as they age, we often see them with power-supply problems. A dead set with the chopper transistor Q901 short-circuit is common. For a reliable repair the following items should be replaced: Q901, IC901, D907, D909, C905, C906 and C912. Should a set come in for any other reason, a check on the capacitors in this list will generally prevent damage on the primary side of the power supply.

The capacitors on the secondary side often become leaky and can create unusual teletext faults or tuning problems, memory etc. The worst offenders are C959, C962 and C964. But, when the power supply PCB is removed, any others can be given a quick ESR test. **A.J.**

JVC AV28X10EKS

This set sometimes produced the unusual symptoms shown in Photo 1. The display would consist of vertical black and white stripes, bowed outwards from the centre, and there would be no response from the remote-control unit or the front-panel buttons. It was very intermittent. When it was present the only way in which the set could be made to work was to switch it off at the mains and then switch back on again. The fault would then disappear for weeks. Teletext subtitles on page 888 also had an annoying flicker as the text was updated.

JVC technical supplied the remedy. Remove C2977, if fitted, and R2953. Then fit a 3·3kΩ resistor in position R2961. This is all on the power/deflection panel. It changes the source of the BSO line to the deflection and RGB processor chip IC301, tying it to the 5V instead of the 141V supply (via R953/4). On the Micon panel, remove the surface-mounted chip IC012 and fit a 42-pin 16MB EEPROM IC, type R27V1652E, in position IC002. The board is already drilled to accept this IC. It has new software, version 3.44.

I suspect that the resistor modification alone would cure the black-and-white stripes fault, but the flickering teletext subtitles would require the EEPROM change. Once this work had been completed a very long soak test proved that the set was now OK. **J.G.**

Toshiba 145E7B

The job card with this colour portable said it would go on and off and you could hear a crackle. Visual inspection revealed the cause of the problem, a dry-joint at pin 10 of the line output transformer. Once this had been resoldered there was a good picture. **J.F.**

BPL KLR9402-01

This colour portable was dead with the 2·5A fuse F501 blown. Further checks showed that Q513 (BU508AF) was short-circuit while Q432 (BU508DF) was leaky. All was well once these items had been replaced. These sets are made in India. Remote-control units can be obtained from Wiltsgrove Ltd. **J.F.**

Ferguson 37140 (TX90 chassis)

The complaint with this set was intermittent tripping. On test it came on all right then after a few minutes the fault appeared. A quick check showed that the HT was high. Further investigation revealed that R225 (33kΩ) in the set-HT network had gone high in value. There was a good picture once a replacement had been fitted, and a soak test confirmed that everything was now OK. Note that the value of R225 varies with tube size – it's 47kΩ in 20in. models. **J.F.**

Ferguson M7022U (625R/ICC17 chassis)

This set tripped off intermittently because the line output transformer was breaking down. When a replacement had been fitted the set produced a very pale picture. The LOPT trouble had led to a fault in the beam-limiter circuit. After various checks and component changes I decided to replace transistor TL02 (BF422). This cured the fault, though the transistor read OK when checked with a meter!

Note that the 625R/ICC17 is different from the ICC17 chassis, especially around the beam-limiter circuit. A sure sign of a faulty LOPT in the ICC17 chassis is the presence of a contaminated ring of 'goo' around the iron former, especially with the biege-coloured transformers. **G.R.**

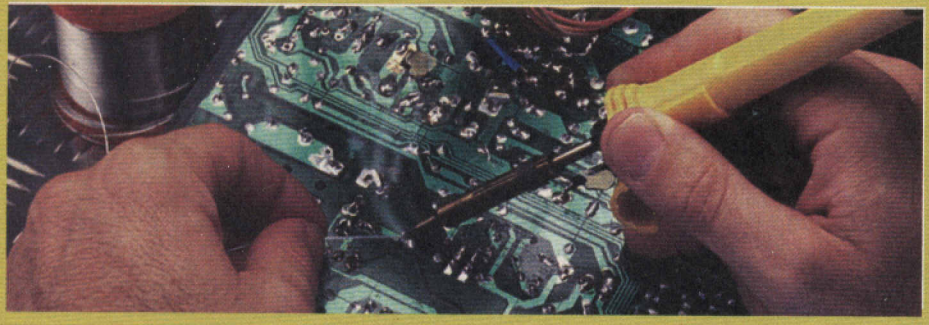
Matsui 201R/20V1R (Grundig CUC7301 chassis)

All four 1N4007 diodes in the mains bridge rectifier were short-circuit, also the MJF18004C chopper transistor (a BUT11A works fine in this position). I also replaced the UC3842A chopper control chip IC630. The set worked when a new fuse had been fitted – but for only one minute! The BUT11A had failed again. This time checks in the chopper transistor's base-drive circuit revealed a leaky 3·6V zener diode (D663). A new diode, BUT11A and fuse gave reliable operation, proved by a long soak test. **G.R.**

Fidelity 3132NF

These widescreen sets with PIP suffer from a problem I've now had twice. At switch on the line output transistor gets hot or may already be short-circuit. Either way, try disconnecting the EHT cable from the LOPT. The set will then probably work (with no picture of course).

The EHT cable has an 'encapsulated box' attached to it near the cavity-connector end. It has an input, an output and an earth lead that's connected to the tube's Aquadag coating. Reconnect the EHT cable to the LOPT and disconnect and isolate the earth lead from the 'EHT box' (keep well away – it has 30kV on it!). Switch on and, if you get a perfect picture, the EHT cable assembly needs to be replaced. A safer way of proving its guilt is to fit a standard EHT cable/connector from a scrap chassis. **G.R.**



Bench Notes

In Part 5 of his series on PC servicing Adrian Gardiner describes the initial stages of installing the Windows 98 operating system. There are also some more 'top tips'

In Part 4 last month I outlined the differences between the various versions of Windows. The remainder of this series will be based on Windows 98, as this remains the most popular version in everyday use. Later on we'll look briefly at XP, which is the best Windows release so far. This month we'll look at installing Windows 98.

Windows 98 installation

Overall, installation is straightforward. Before you begin you will need your Windows CD, and the licence that has the number on it to enable the software. There are basically three types of install that can be performed: a fresh install in a blank machine; a clean install in a machine that's already been in use; and a reinstall in a machine in use. There are common elements and one or two variations that depend on the type of install. We'll deal with each in turn.

To install Windows you need to set the BIOS to boot from the CD drive. See previous articles on how to do this. Insert the CD into the drive and reset the PC. You will then be presented with a menu that offers you the choice of 'booting from hard disc' or 'booting from CD'. Choose the latter. A second menu will then appear, offering several boot options. Your choice depends on the following situations:

(1) Fresh install in a blank machine. Chose the option to 'Set up Windows 98'.

(2) Clean install in a machine that's already been in use. In this case you want to wipe the machine before installation, the end result being that the machine is 'like new'. Choose 'Boot to Command Prompt with CD support'. You will then be presented with the prompt. Type 'd:' and press return. Then type 'cd win98' and again press return. This logs you on to the Windows set-up directory. Type 'format c:' and hit return. A warning is presented, telling you that you are about to erase the hard disk. Accept it and the machine will be wiped. When the process has been completed, restart the PC and this time choose 'Set up Windows 98'.

(3) Reinstall in a machine that's already in use. This is when you want to install over the top of an existing installation in order to attempt to repair a fault. Although this may cure some problems, it is usually best avoided and alternative solutions considered – we'll look at these later in the series. If you do want to attempt this option however, choose 'Set up Windows 98'.

Whichever of the above routes you follow, you will end up with a welcome screen for the install program. What follows from this point is fairly straightforward and requires little user interaction.

You will initially be requested to accept a couple of questions – but you don't get a choice! They are in fact statements telling you what is going to happen rather than anything else. Just accept the various points until you get to the option 'Type of Install'.

So far so good. Your choices now are associated with the type of installation you want to perform. The options here are Typical, Minimal or Custom. Minimal was designed with laptop users in mind: it installs only the basic requirements. Typical was designed for most users: it installs all the standard options. Both these choices have limitations however, mainly because they were programmed for the American markets. Several alterations are required subsequently, and as a result of this I always recommend the Custom install option. Although Windows warns you that this is intended for advanced users, the questions that follow are all relatively straightforward.

When you choose the custom option Windows will ask you what 'components' you want to install and present you with a list. For most purposes you can simply click on 'Next', as the options selected are appropriate. If you are familiar with the various components of Windows, feel free to select or deselect them at this stage.

Note that you can easily change this later from the control panel.

The next set of questions relate to the country you are in, the language you wish to use, and the keyboard layout. Choose UK or British as appropriate. Then sit back and wait while the set-up program installs Windows. This is a good time to put the kettle on!

Once Windows has finished copying its various files it will restart the PC. At this point you can go back into the BIOS program and reconfigure the system to start from the hard disk. When it restarts, Windows will search for all the plug-and-play devices installed in the PC. These are hardware devices, such as a graphics card, that are designed to identify themselves to the operating system. Most modern hardware is plug-and-play.

During this time you may be prompted to insert various driver discs that would have come with the system when new. Windows may need to restart several times during this process, as it initialises new drivers. Once all the plug-and-play devices have been installed, Windows will repeat the process for 'non-plug-and-play' hardware.

When all this has been done, the set-up program will finalise its various settings. The last question you will be asked during this part of the procedure is to set the clock and time zone (GMT). You will also be asked to enter your registration code, to prove your ownership of Windows.

The PC will then restart and the familiar desktop will appear.

Next month

Next month we will look at what happens next, common installation problems and how to optimise your Windows operating system.

Top tips

Press 'Ctrl' and 'A' to select everything in the current window. You might want to delete or copy it etc.

Press 'Ctrl' and 'X' to perform the cut operation.

Press 'Ctrl' and 'C' to perform the copy operation with the currently-highlighted text.

Press 'Ctrl' and 'V' to past cut or copied text.

Finally, the most useful of them all. Press 'Ctrl' and 'Z' to undo the last operation. Very useful when everything suddenly disappears off the desktop!

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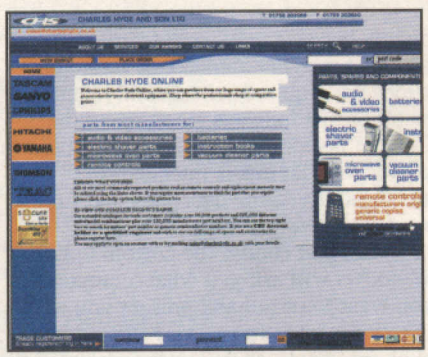
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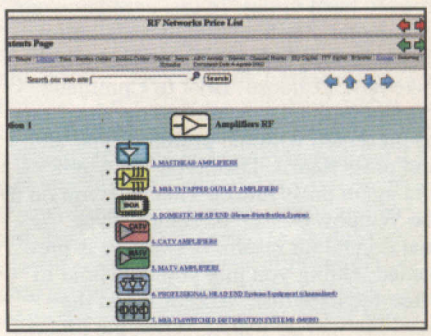
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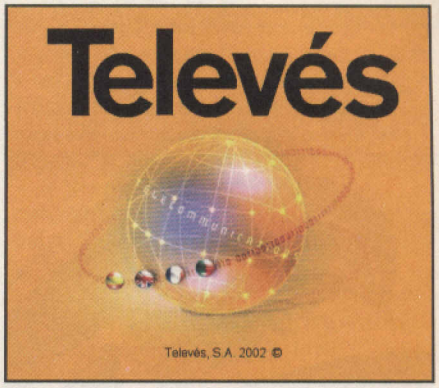
The MCES site gives details of our range of service including Tuners, Video Heads, RF & IF Modules plus latest prices offers.

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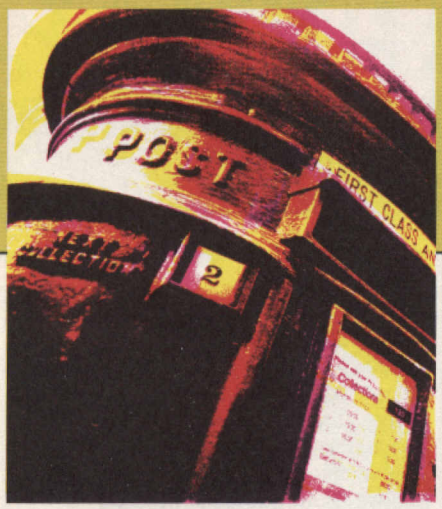
Make sure of your copy of *Television*

It can be difficult finding a copy of *Television* at local newsagents. The number of magazines being published keeps increasing, which means that newsagents have less shelf space for the display of individual titles. Specialist magazines in particular get crowded out.

There's a solution to the problem. Most newsagents provide "shop-save" and/or home-delivery services. There's no charge for a shop save. You simply ask your newsagent to order a copy for you: it will be kept on one side each month ready for you to collect. Home-delivered copies are ordered in the same way, but generally incur a delivery charge.

A newsagent can order any magazine for you, whether or not the shop normally stocks it.
If you buy your copies of *Television* from a newsagent and want to make sure you get every issue, just ask at the counter.

LETTERS



Send letters to "Television", Highbury Business Communications, Anne Boleyn House, 9-13 Ewell Road, Cheam, Surrey SM3 8BZ or e-mail tessa2@btinternet.com using subject heading 'Television Letters'.

Please send plain text messages. Do NOT send attachments. Be sure to type your full name, address, postcode, telephone and e-mail address (if any).
Your address and telephone number will not be published but your e-mail address will unless you state otherwise.
Please send ONLY text intended for the letters page. Correspondence relating to subscriptions and other matters must be sent to the office address given above.

Video resolution

I found Colin McCormick's article on recording DVDs (July) very interesting. There's a problem with Tables 1 and 2 however. The accompanying text is correct, but 'vertical' and 'horizontal' in the tables have been transposed. Also the quoted horizontal resolution figures are misleading, not least because no units are specified.

The traditional units for horizontal resolution are 'lines per picture height', i.e. the number of alternate black and white lines that can be resolved across a width equal to the height of the picture. The figures quoted in Table 1 seem to be in these units, since the limiting horizontal resolution for DVD and Digital Betacam is indeed around the value of 500 stated (in the case of a 4:3 aspect-ratio picture). It's apparent from the figures quoted however that the units used in Table 2 are different, being the number of pixels across the total width of the picture. To convert 'lines per picture height' to pixels one needs to multiply by approximately 1·37. It is therefore misleading to compare the 'source' resolution in Table 1 with the 'capture' resolution in Table 2, because different units are being used.

The text states, correctly, that it is better to use a significantly higher resolution on your video-capture card than you are likely to get from the video source. But when using the figures quoted in the tables an additional factor of about 1·4 should be applied.
Richard Russell,
Orsett, Essex.

The silicon planar process

I have a correction to make to your leader An Adventurous Life (June issue): the silicon planar process was developed by Fairchild.
Keith Scott,
email communication.

Philips AA5 AA chassis

Two sets fitted with this chassis came in recently from a local caravan holiday park. They had the same unusual fault: the picture was fine with the volume turned down, but flashed progressively worse as the volume was turned up. The 12V supply for the audio output stage is obtained from the secondary side of the chopper transformer. It was low at 9V, and went lower the higher the volume.

A lot of time was wasted replacing components in the power supply and the audio output stage. Eventually I collected a good working set from the same site and carried out some comparison checks. This revealed, in the faulty sets, a reading of 100Ω between the earthy side of the 12V supply's reservoir capacitor C2540 and chassis. The circuit diagram shows a direct connection to chassis here. The reading was between R3558 and pin 1 of the chopper transformer. Tracing the print around the board I came to the corner by the tuner where the audio IC's heatsink has a lug through the board. The print at this point was cracked. A quick repair cured the fault. The situation had been exactly the same with both sets.

To work on this model (Pye 37TA1171-05), which has the cabinet split horizontally with no back, you have to remove the tube (two screws), then the chassis, and reconnect them together on the bench! I keep a spare mains lead/plug from a scrap set to save having to remove the mains lead from the empty lower cabinet. Several Philips sets, fitted with a number of chassis, have used the same yellow plug over a number of years.
Martin Cole,
Service Manager, Central Radio Services, Burnham-on-Sea, Somerset.

TiVo

Michael Maurice (letters, June) attributes the failure of TiVo in the UK to poor marketing. In my case it was the £10 a month subscription required to get the electronic TV programme data. This seemed excessive.
Brian Gilbert,
Hampton, Middx.

SkyStar 2 boards

The Technisat SkyStar 2 boards mentioned in the June DX and Satellite Reception column can be obtained from http:/www.netsystemusers.com/ at £50 including VAT, post and packing. This is a UK-based website.
Paul Sansom,
Reading, Berks.

Sharp DA100 chassis

As Philip Salkeld points out correctly in his letter (July) the power supply in this chassis, like many other modern power supplies, will not operate correctly when started with a dummy load attached. What I should have said in my article on the chassis (May) is that for stability tests a dummy load (60W bulb) can be connected or, preferably, switched in – once the HT has been established.

A suspect or freshly rebuilt power supply should be monitored at switch on. If an analogue meter is not available, an oscilloscope can be DC-coupled via a x10 probe connected to the HT rail, marking where 150V is. Switch on while observing the scope, at the ready to switch off if the trace rises above your marker (do this with the line output stage disconnected).

Another approach to the tricky job of keeping the temperature down when replacing the optocoupler ICs in these sets is to adapt an old pair of sprung tweezers (spade-head if possible) by bending the heads at 45°. Use these to hold the IC and dissipate some of the heat.
Philips Laws,
Sunderland.

Thomson ICC7 chassis

In his letter in the July issue Ray Withey complains about poor receiver design and in particular refers to the mains switch in the Thomson ICC7 chassis. Two different types of switch are used in sets fitted with this chassis. One is soldered directly to a

PCB that clips into a plastic runner/latching arrangement. The other has wires soldered to its tags and is contained in a plastic housing, with plastic clips at each side to hold it in place.

I suspect that Ray Withey refers to the latter. A simple way of removing this type is to use a U-shaped piece of thin metal with a flat bottom. Each side should be about 2·5cm wide, the unit being about 7cm long. Slide this under the switch, holding the wires to lift it slightly. The sides of the unit open out the two plastic clips, enabling the switch to be removed easily. If you have an old Thorn TX9 or TX10 chassis with a metal can over the IF board, just cut about 2·5cm off the can and use this.

Pete Howarth,
Halifax.

Philips Turbo deck

In his June issue Service Casebook Michael Maurice mentioned drum seizure in VCRs fitted with the Philips Turbo deck. I'd like to elaborate a little on this, based on my own experience. Not knowing where to obtain the special tool to separate the lower and upper sections of the drum, let alone its cost, I have adopted the following procedure – with continued success.

The first thing to do is to put a dab of quick-drying paint or nail varnish on the perimeter of the centre spindle and a corresponding one on the drum itself. This will aid realignment during reassembly. Doing so initially ensures that the paint/nail varnish has time to dry before dismantling the drum. It goes without saying, but cannot be emphasised enough, that great care is needed from this point on to avoid head tip or ribbon cable damage. If you don't have a mica spacing washer, use feeler gauges: select one that just fits the gap between the upper and lower sections of the drum and make a note of it.

Next, carefully prise off the securing clamp. I use a large flat-bladed screwdriver, working around the periphery. Remove the three screws that secure the bottom plate. It's more than a covering plate, as it contains a bearing on which the drum shaft sits. Once it has been removed the upper drum is free to move until the tips contact the lower drum, hence the need for great care. Then, holding the upper drum and rotary transformer magnet in each hand, twist the head from the shaft and pull the shaft from the housing. If the fit is tight, it might be necessary to apply a little heat first to the drum/shaft area.

After cleaning and relubrication, reassemble in the reverse order, using the paint marks for alignment and setting the upper/lower drum gap with the feeler gauge or mica spacer. Once everything has been reassembled the drum should work without adjustment. If the alignment is out by much the head switching points will be incorrect, and jumping or a line at the bottom of the picture may be evident.

When you are satisfied that everything is OK, run a little superglue around the drum and shaft to secure them. Any attempt to replace the original clamp without the proper tool looks virtually impossible without the risk of damage – unless anyone knows differently!

One final thing. Don't forget to refit the rear earthing screw, or the picture will be obscured by interference dots and lines.

Mike Hobby,
Horsham, West Sussex.

HELP WANTED

The help wanted column is intended to assist readers who require a part, circuit etc. that's not generally available. Requests are published at the discretion of the editor. Send them to the editorial department or email to tessa2@btinternet.com

Wanted: Service manual (photocopy would be OK) for the Sony Model KVX2562U (AE2 chassis) – or information on adjusting the picture geometry and grey scale in the service mode. Will cover all costs. If anyone can help, please call Adrian Jones on 01302 788 202 or emailvicjan.jones@btopenworld.com

Wanted: Main board for the Samsung camcorder Model VP-M50 or a scrap machine. Phone Peter Haida daytime on 01282 864 415 or email peter@nveuk.com

Wanted: For spares, Quad 33 and 44 preamplifiers, 303 and 405 power amplifiers, FM2 and FM3 tuners etc. Phone Mike on 01758 613 790.

For sale: *Television* issues from 1991-2002 complete. John Stacy, 3 West Park, South Molton, Devon, EX36 4HJ. Phone 01769 573 382.

Wanted: A Sanyo midi hi-fi system Model DC-F450U, working or not, for spares. Also a Sanyo camcorder Model VM-LC100P – I particularly need the battery compartment door. Buyer will collect. Phone L.S. Bradley on 01903 265 503.

Wanted: Instruction manual for the Toshiba VCR Model V610B. Phone Mike Parker on 01707 366 194 (daytime) or email mike.parker@roche.com

Wanted: BA536 dual audio output IC (obsolete). Also a service manual or circuit diagram for the Sharp stereo radio/cassette recorder Model GF8989. If anyone can help please contact Laurie Watkinson, Telesonic Services, Week St Mary, Holsworthy, Devon, EX22 6UJ. Phone 01288 341 254.

Wanted: Service manual for the Marconi Marine Nautilus VHF radiotelephone. Brian Long, Longster, Smerral, Latheron, Caithness, KW5 6DW. Phone 01593 741 249.

Wanted: Old half-inch diameter ferrite rods. Must be six inches or more long. Willing to pay good money for them. Peter Tankard, 16A Birkendale Road, Sheffield, S6 3NL. Phone 07931 463 823 (mobile) between 9 a.m. and 10 p.m. (seven days a week).

Wanted/for sale: Require a ZC93132P IC, circuit reference number IT01, for the Ferguson VCR Model FV32L. Have for disposal a 100MHz scope in good condition, asking price £350. Phone F. Willing on 01277 374 166 (Brentwood, Essex).

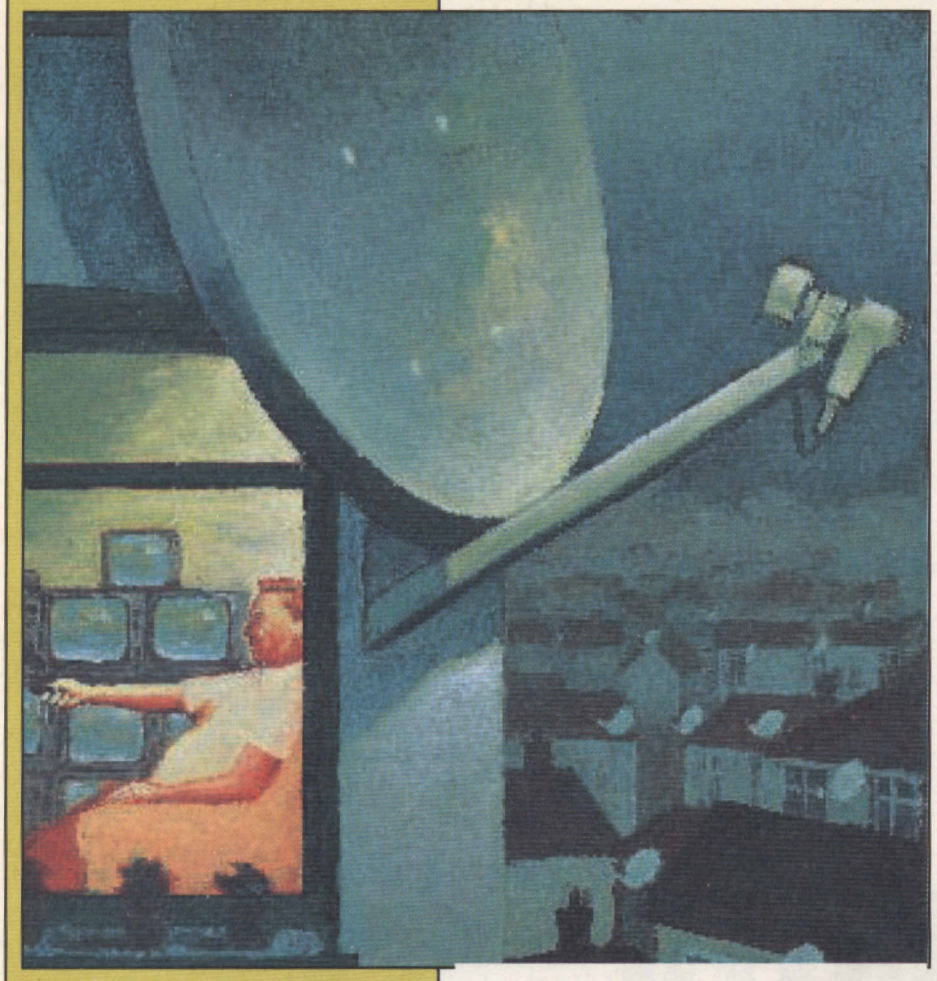
Wanted: Dial restringing information for the Sony Model ICF-6800W. John Twamley, 68 Main Street, Swords, Co. Dublin, Eire. Phone 00 353 01 840 2206.

Wanted: Lower head drum assembly for the Toshiba VCR Model V312B. Also any information on a source of supply for the original handset, and a circuit diagram for the Soundwave portable Model CTV1405R. All costs met. Phone Alan Harris on 01432 769 027 (Hereford) any time.

Wanted: Circuit diagram or service sheet for the Sparkrite SX2000 electronic ignition unit. Any information would be greatly appreciated. Phone Neill Ward on 07887 693 232 or email neill.ward@ntlworld.com

Wanted: Tape drum and head-wheel assembly for the Grundig VCR Model GV250. The part number is 75986-21030 (equivalent to Panasonic part no. VEG0966 5053106A). Please phone Michael Simons on 020 8422 2209 if you can help or provide any information on a likely source.

Wanted: Early (pre 1975) colour television sets, equipment, picture monitors, spare parts, home-build equipment, catalogues, etc. Please telephone Keith Parker on 020 8422 5049.



SATELLITE NOTEBOOK

Reports from
Christopher Holland
Hugh Cocks
David Ingrey
and
Michael Dranfield

Faulty tuner

Mr Stamford's Pace 2400 digibox had given trouble-free reception since it was installed about three years ago. But it had now started to play up. Sometimes, when changing channel, the "no satellite signal" message would be displayed or alternatively "there is a technical fault with this channel" would be seen. Rapid channel changing would cure the problem, which was worst with ITV. More recently all BBC reception became affected and a cure was more urgently required, as terrestrial reception in the area wasn't good.

The signal from the dish appeared to be OK, but we replaced the LNB for good measure. It came as no surprise that this didn't make any difference! The symptoms were actually typical of a tuner that's dying. The situation is often worse when the digibox is in a confined space with poor ventilation. If the digibox is switched off for any length of time in this situation, allowing the tuner to 'go cold', it's often totally dead when the digibox is powered up again.

Tuner replacement is straightforward, see Photo 1. It can be removed from the main PCB with little difficulty, using a desoldering tool, and the complete repair takes only a short time. The most tedious part is removing the PCB from the case then replacing it. Ensure that each pin of the replacement tuner has a good soldered connection to the PCB. It's a good idea to carry out an initial reception test prior to fixing all the screws that hold the PCB in the case, in case something's not right.

We buy exchange tuners from Kesh Electrics, which ccan be found on the internet at
www. pacelink.co.uk

The phone number is 02868 631 449. The tuners cost £15 + VAT. There's same-day despatch, and the tuners have a one-year guarantee.

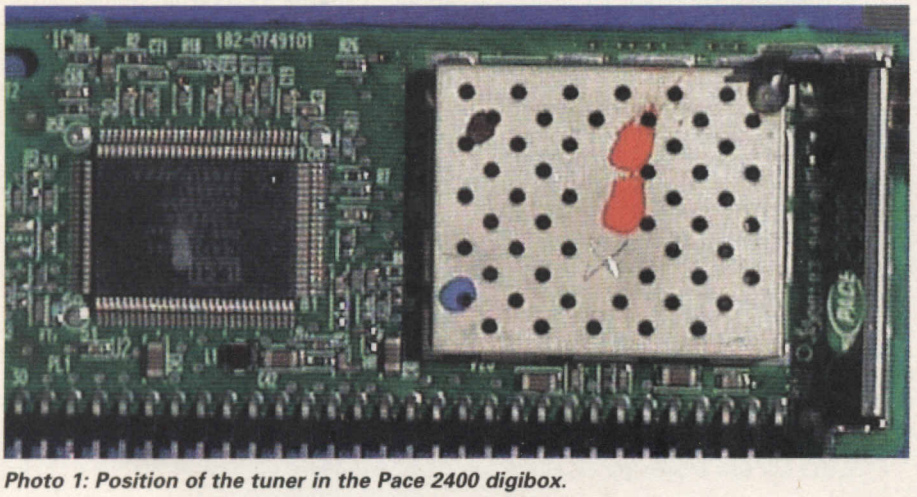


Photo 1: Position of the tuner in the Pace 2400 digibox.



Photo 2: House of Commons colour-bar caption received via Intelsat 903 (34°W). The link was operated by Irish broadcaster RTE.



Photo 3: Eritrea TV test caption received from Arabsat 2B (30·5°E).



Photo 4: Yemen TV from Arabsat 2B.



Photo 5: Sudan TV from Arabsat 2B.

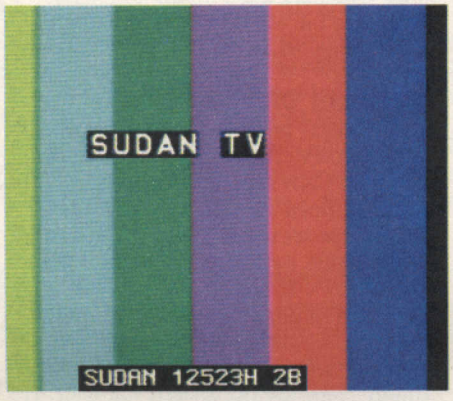


Photo 6: Sudan colour bars from Arabsat 2B.



Photo 7: Eritrea TV from Arabsat 2B.

Table 1: Latest digital channel changes at 28·2°E

Channel and EPG no.	*Sat*	*TP*	*Frequency/pol*
ACTV (271)	EB	C5	11·390GHz H
Amrit Bani Radio (926)	EB	D7S	11·588GHz H
Friendly TV (268)	EB	D9S	11·623GHz H
LBC 97·3 FM (927)	2B	32	12·324GHz V
Test card	EB	C5	11·390GHz H
Toons & Tunes (627)	EB	C6	11·426GHz V

TP = transponder. EB = Eurobird. 2B = Astra 2B.

The main cause of failure is the IC under the small screening can. It has relatively little heatsinking, and thus overheats and eventually fails. The Kesh replacement tuners have upgraded heatsinking and thus improved reliability.

Mr Stamford's digibox was soon up and running and giving good results. It had lived on a shelf in the TV cabinet, immediately below the set, allowing heat to build up. So it was moved to a small adjacent table and advice was given not to put anything that might obstruct airflow on top. Hopefully the family cat won't take to lying on top of it. In the past we've had several instances of box failure as a result of this! **C.H.**

Digital channel update

The latest channel additions at 28◊2∞E are listed in Table 1. Where allocated, the EPG number is shown in brackets after the channel name. Digiboxes were changed to Astra 2D BBC transponders on May 21 (see last month) – the parallel 2A transponders were switched off on May 29. The BBC's interactive service continues at 12·442GHz V (2B). Radio 2 and 4 may move to this transponder in the coming months to give improved reception in Europe following the change to 2D, which has a reduced though still significant European coverage.

Sky One and Cartoon Network have moved from transponder 19 to transponder 30 (12·288GHz V). At the time of writing parallel transmissions via transponder 30 continue. The Sky Wecome Channel (998) and Channel Line up (996) have also moved, from transponder 26 to the digibox default transponder 4 (11·778GHz V).

Simply Ideas, Simply Home and Simply Holidays have moved from Astra to Eurobird transponder D2S (11·488GHz V).

The Icelandic channels have left transponder 42 (see last month) which is now inactive. **C.H.**

Mobile phone interference

Mr Blake has been receiving Russian TV from the Express 3A satellite (11°W) for a couple of years, using a 1·8m dish. The incoming signals are fed to an analogue satellite TV receiver that provides reception of the Russian Channel 1 (3·675GHz) with Secam colour, and a digital receiver that provides reception of various channels including RTR Planeta (3·694GHz). Signals available from the Express 3A satellite were listed in the April issue. Just recently the digital reception has been affected by break-ups, particularly with the RTR channel, while reception of the analogue channel has been marred by intermittent faint 'radar'-type horizontal lines.

When I arrived at the house I noticed that a new mobile phone transmission mast had been erected nearby. Mr Blake confirmed that his reception problems had started when the mast went up. Using our spectrum analyser, I was able to see vague blips in the 3·6-3·7GHz range via the C-band LNB. This is at about twice the frequency coming from the mast. Unfortunately C isn't an 'official' band for reception in the UK, so lodging a complaint probably wouldn't have done much good. But Mr Blake was keen to have a quick cure if at all possible.

Fortunately the mast is to the north of the house, while satellite reception is from the south. I was able to move the dish to a part of the garden where the bulk of the house blocked the signals from the mast. This provided a complete cure. A new cable run was needed and was buried in plastic pipe in the garden to minimise the possibility of interference pickup. In addition the original signal-splitting between the two receivers had been via a loop-through facility in the digital one: I changed this to a passive two-way IF splitter, as the loop-through appeared to include amplification and could be susceptible to interference. **C.H.**

Unusual test cards

This month we're starting a new series of photos showing unusual test patterns and captions seen via satellite TV. Photo 2 shows a UK House of Commons colour-bar caption found at an RTE (Radio Telefis Eireann) link via Intelsat 903 at 34°W. Various RTE links come and go through the day between about 11·130-11·150GHz V, with an SR of 9,400 or 4,700 and 3/4 FEC. Transmissions may be

Table 2: Ku-band transmissions available at 30·5°E

Frequ.. ncy/pol	*SR/FEC*	*Service*
12·509GHz H	3,200 3/4	Algeria Ch. 3 plus two radio stations
12·515GHz H	3,000 3/4	Yemen TV plus Yemen radio. See Photo 4
12·523GHz H	3,000 3/4	Sudan TV, Sudan Radio and Omdurman Radio. See Photos 5 and 6
12·546GHz H	3,110 3/4	Feeds
12·550GHz H	3,330 3/4	Feeds
12·564GHz V	5,632 3/4	ART feeds
12·587GHz V	5,085 3/4	Blue Nile TV (evenings only)
12·620GHz V	27,500 3/4	Al Majd TV plus one radio station
12·661GHZ H	3,000 3/4	Eritrea TV plus one radio station. See Photos 3 and 7
12·695GHz H	3,700 3/4	MBC 2 TV plus MBC radio
12·711GHz H	5,632 3/4	Feeds
12·712GHz V	5,400 3/4	Quatar TV feeds
12·722GHz H	5,2003/4	MBC 1 TV, Al Arabiya TV plus MBC FM Radio
12·722GHz V	4,300 3/4	LBC TV (Lebanon) feeds. See Photo 8
12·728GHz V	3,000 3/4	Al Maj TV plus one radio station. See Photo 9
12·740GHz V	5,084 3/4	Oman TV plus Radio Oman and Oman FM (in English)

conventional MPEG 4:2:0 format or the MPEG 4:2:2 format increasingly favoured by broadcasters. **H.C.**

Ku-band reception at 30·5°E

Last month I listed the C-band signals available from Arabsat 2B (30·5°E). This month we'll look at the Ku-band output, see Table 2. Some stations use it to link with channel multiplexes at the nearby Arabsat 2A (26·5°E) or Hot Bird.

Al Majd TV can be found at two different frequencies, as a narrow- and wide-band signal. Various Arabic broadcasters also use it for newsfeed linking.

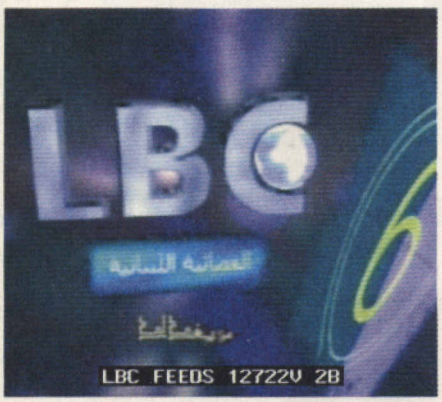


Photo 8: LBC (Lebanon) via Arabsat 2B.



Photo 9: Al Majd TV at 2B.

Eritrea TV (12·661GHz) has very variable strength. During the day a test caption is transmitted, see Photo 3.

MBC 2 shows mainly US TV series, in the original language with Arabic subtitles. **H.C.**

Grundig GDS200

This digibox was dead with no standby LED illumination. Checks showed that the 5V supply was low at only 3V. The cause was U4 (PQ30RV21) in the power supply. **D.I.**

Grundig GDS200

This digibox produced the 'no satellite signal' message. Voltage checks showed that the 30V supply was missing. Zener diode ZD1 (30V, 1W) was short-circuit and S11 open-circuit. **D.I.**

Amstrad DRX100

This digibox worked intermittently. When the fault occurred the picture would freeze and remain on the screen but live sound continued. The STP20 micro chip would also lock up, and the box wouldn't respond to remote-control commands or operation of the buttons on the front panel. The only way to get the box going again was to disconnect it from the mains supply. The cause of the fault was traced to IC U16 (74LVTH16244), the tri-state bus converter. A replacement restored normal operation. **M.D.**

Pace 2500S

This digibox would sometimes work normally but at other times would be stuck in standby with no LNB supply and the STI5512 IC stone cold. The cause of the problem wasn't the STI5512 chip however – I had replaced it some weeks earlier to cure another problem. I traced the cause to crystal X1300 (8·3886080MHz) which was intermittent. It clocks the house-keeping micro. **M.D.**

Grundig GDS200/1

This digibox had the usual power-supply capacitor problem. After attending to this I found that the software was out-of-date. A forced download was carried out but wasn't written into the flash memory. The fault was cured by replacing the four M29W800AT90N1 flash-memory chips U6-9. Don't forget that these chips hold the serial number of the digibox. Thus after replacing them it will no longer recognise the viewing card as being the correct one. **M.D.**

Amstrad DRX300

This digibox produced the 'no satellite signal received' message, the problem being no LNB supply. A quick look at the installer menu showed that the LNB power was set to on. I then found that the LNB enable switching transistor T104 (BC848C) was turned off. Its base voltage comes from pin 89 of the QPSK chip IC103 (CX24110). When I shorted the collector and emitter of T104 the LNB supply came up, but all was not well. The supply was at 18V (horizontal polarisation): a correctly booted box should provide 13V (vertical polarisation) so that it can start searching for the channel listings.

LNB polarisation control comes from pin 86 of IC103, so it seemed that this chip was faulty. But IC103 is linked to the front-end ZIF chip (CX24108-20ES) via a three-wire bus. The ZIF chip is notorious in this model, often being the cause of intermittent picture freezing. In view of its notoriety I decided to replace it first. This cured the fault.

It highlights a problem you increasingly meet in electronic servicing: the device that produces the wrong output signal is not necessarily the one that's faulty. **M.D.**

Solution to Test Case 478

– see page 621 –

Videography, together with its PC accoutrements and accessories, is now a big business. The question of which DVD-writing format to use was easily solved. Victor purchased a 'dual-standard' burning deck that enabled him to produce either DVD–R or DVD+R discs for his customers. The one he chose was the Sony DRU500A: there are other makes and models.

Another piece of hardware made possible the 'lossless' transfer of legacy VHS footage into the digital labyrinth of Victor the Video's PC. It was an analogue-to-digital converter with a Firewire interface. The 'one-way' Canopus ADC50 was chosen on cost grounds and worked well in this application. For those who want both analogue-to-digital and digital-to-analogue conversion, more money can be spent on an item like the Dazzle Hollywood Bridge etc.

Finally, the problem of LP tape compatibility between two mini-DV camcorders. The mini-DV LP tracks are so narrow that this cannot be guaranteed, especially when one of the camcorders is old or worn. Tape-guide adjustment in a specialist workshop might have provided a solution, but could have introduced other problems. Fortunately the old machine was still working. So the LP tapes were played out from it, using the Firewire digital link, into the new camcorder, recording in the SP mode. In fact the old cassettes were over-recorded, this time with an improved chance of forward compatibility. The extra cassettes needed were willingly purchased.

Problems solved!

NEXT MONTH IN TELEVISION

Servicing the Sharp D100 chassis

Start of an in-depth servicing feature by Alex Towers on the Sharp D100 (50Hz) chassis. The chassis and its derivative the DA50W is used in a number of widescreen models. While there are a number of circuit differences to cater for different tubes etc., basic fault-finding procedures remain the same. Part 1 will introduce the chassis and deal with the power supply, including the power-factor correction circuit used in some models.

A PC-based satellite receiver

PC TV and radio reception has advantages for some purposes. The SkyStar 2 card is readily available and flexible in operation, being able to handle various types of transmission. Hugh Cocks has been trying one out and reports on its features and performance.

Latest JVC technology

JVC, always in the forefront of AV developments, has recently introduced a number of new products. George Cole reports on their features and the technology involved.

Optical amplifiers

The future for CATV will be transmission at light frequencies right up to the subscriber. Until recently optical relay amplifiers have had to demodulate, amplify then remodulate the signal, but optical amplification is now a practical technology.

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WHAT A LIFE!



Sony dry-joints, VCR faults, record-changer unit difficulties, UPS trouble and a plumbing problem. Donald Bullock's commentary

It's an ever-changing world. When Sony first launched its TV sets in the UK, their extreme reliability, coupled with their robust construction and superior pictures, frightened the few remaining British manufacturers to death. The sets had no 'stock' faults that we knew of and their Trinitron tubes, based on a new concept in colour tube design and operation, bore witness to Sony's capacity to innovate.

Sony marketing

In those early days several of my established customers came to me to buy one of these sets. So I phoned Sony and asked to be supplied. The chap who answered the phoned politely laughed me out of court.

"We supply only selected dealers who pass our detailed scrutiny" he said. "You'll have to refer your customers to a Sony dealer."

"Look" I replied, "your purpose as a company is surely to make money. You sell television sets. I want to buy some. Simple enough, isn't it? Let's set the scene: you sell, I buy. You fulfil your purpose and prosper accordingly."

"Your basic assessment is incorrect, sir" he said. "We aren't in business to make money. We're in business to make people happy."

"Well, you aren't making me very happy" I commented, "and when I tell my customers the result of this conversation they won't be very happy either. So you don't seem to be on the right track to me."

So I developed a dislike of Sony, though I had to concede that their products were excellent. In fact I ended up buying an expensive Sony sound system.

Now, today, virtually every multiple outlet and catalogue dealer sells Sony – but they still haven't found out how to make people happy, if the experiences of Mr Woodford, one of our old repairs customers, is anything to go by.

A Sony KV25X5U

He told us that his Sony Model KV25X5U, which is fitted with the FE1 chassis, spent more of its early life in the retailer's shop than it spent with him and continues to give trouble. There were several things wrong when he brought it to us the other day. There was poor EW correction, unacceptably high contrast, lack of width – and it kept shutting down spontaneously.

Every one of these faults was caused by dry-joints, for which so many Sony products are infamous. The picture geometry trouble was caused by dry-joints at the 9V regulator IC605 (TYA7809CTV), the intermittency and width problems by dry-joints in the chopper power supply and line output circuits, and the contrast trouble by more dry-joints in the video section. Whilst we were at it we found and remade many more poor joints in various parts of the chassis.

"My neighbour's got one just like it" Mr Woodford said as we were loading the set into his car. "Gradually, the picture has gone dull and red. He wonders whether you would care to look at it."

"I don't think it would be too wise, Woody" I replied, "my news would only make him very unhappy. I've seen so many like that, and the price of a new Sony tube is out of this world. Tell him to throw it away and buy another set."

"Not me!" he exclaimed.

Mrs Drubit's Aiwa

We came back in to find the Reverend Goode entering the shop together with Curate Bland, who was sagging under the weight of an Aiwa HVFX1500 VCR.

"Hello Donald, old sport" boomed the reverend, "you look well! I see that the Lord is smiling upon you!"

"More likely laughing hysterically, Vicar" I replied. "I wish we could swap jobs!"

"Oh, I'd make a terrible electronics engineer" he boomed, "and you, er, you . . ."

"I know, I know" I said, "what's the trouble with the recorder?"

"Terrible picture and sound" he replied, "it's old Mrs Drubit's, you know. She's the oldest in my flock – ninety-eight, and none to well. She thinks the devil's in the machine and called upon me to exorcise it. If you can get it right it'll help keep her faith. Er, she's very well off you know, and the church does need a new roof . . ."

"I understand" I said, making out a job note.

The cause of the trouble was in the capstan motor. It raced at high speed, and we found that the flywheel had slipped and had been rubbing on the windings for some time. They'd shorted together in places. A new one cured the fault, and I noticed the Reverend happily propelling her and her wheelchair to tea at the vicarage soon after.

I mentioned her to John Berryman, the hale and hearty village undertaker who called in shortly afterwards.

A Panasonic NVFS90

"Yep, ninety-eight she is" I said, "wonderful isn't she?"

"Well, 'er goes on if that's what you mean" he answered. "Ever since I put her 'ubby away thirty years ago 'er's been promising I'd get 'er when the time comes. But it don't seem to come. I gets a lot from these parts. 'Ow you been keeping?"

I looked at him coldy. "Bad news, John" I said, "very well indeed thanks. Now what have you brought for us?"

It was a Panasonic NVFS90 VCR. When it was cold it was all right, but when it got warm it flew into the stop